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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

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Vol. 16 NEW YORK, FEBRUARY, 1918 No. 2

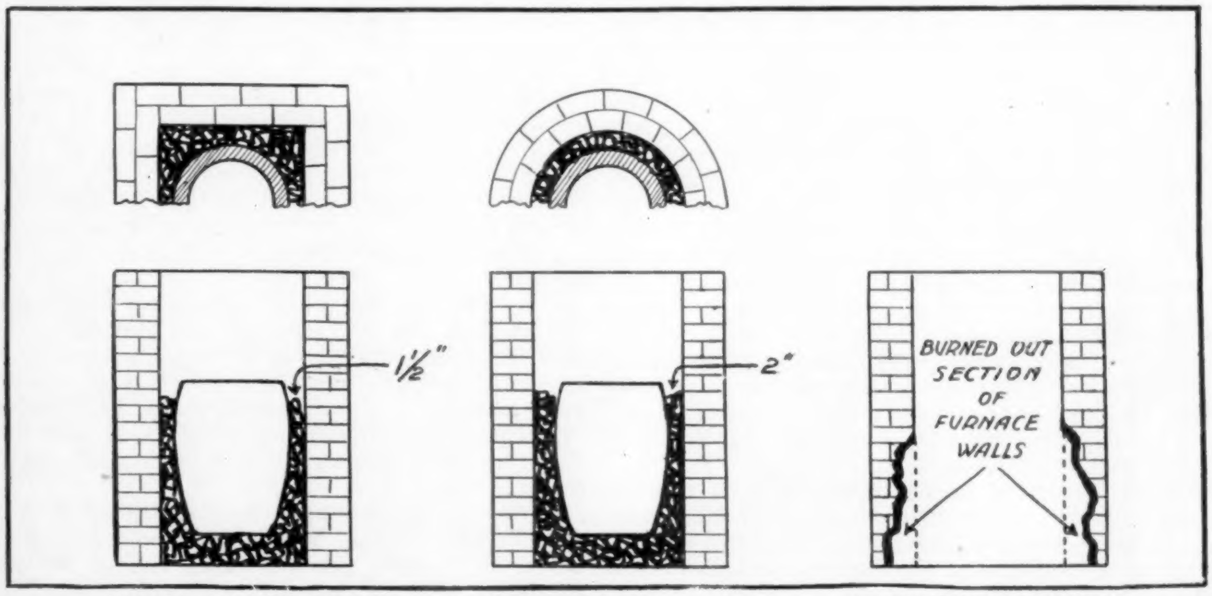
CONSERVATION IN THE FOUNDRY

The Saving of Coal and the Care and Repair of Brass Melting Pit Furnaces.

Written for The Metal Industry by R. E. Modrow.

Owing to the scarcity of coal at present, the writer would like to make a few suggestions which, if heeded by foundry men, will help in the conservation of coal, and at the same time reduce the coal bills.

Not long ago I happened to go into a brass foundry and the proprietor could not express himself strong enough against the present coal situaiton, saying that he could not secure coal enough to keep his furnaces going and surely something should be done by somebody to provide more coal. "Well, Jim," I replied, "let us have a look at your furnaces." One peep at one of the six furnaces told me the reason why Jim was short of coal. In the first place the coal space between the wall of the furnace and the crucible was altogether out of proportion to requirements, the same being 3½ inches where they should have been but 2 inches.



CORRECT COALING SPACE FOR SQUARE FURNACE. CORRECT COALING SPACE FOR ROUND FURNACE. SHOWING HOW WALLS OF FURNACE ARE WIDENED BY WEAR.

After the fires were drawn I also noticed that the inside shape of the furnace made it look like a water bottle of the drinking water type used on the table, due to the burning away of the bricks and also to neglect in repairing the furnace in time.

It took Jim but a short time to be convinced that he had been shoveling about 800 lbs. of coal per day which were unnecessary, and simply wasted. The two main points to bear in mind with furnaces are: Have the proper coal space between walls and crucible and keep the walls straight up and down, or as near to straight as possible.

There is a difference of opinion by foundry men as to the coal space necessary. However, in my experience, I have found that with a good draught a space of 2 inches at the widest part of the crucible would suffice for all crucibles up to No. 35, melting brass and bronze. For crucibles up to No. 100 an extra ½ inch is sufficient. This applies to round built furnaces. For square built furnaces I made the space 1½ inches up to No. 35 pot, and 2 inches up to No. 100 pot. All of these measurements are at the widest part of the crucible. Foundries using several sizes of crucibles should have furnaces to suit the crucibles in order to secure the proper coal space. *It is better to have an extra furnace. It pays.* As to the second point, some foundries have gotten into the habit of letting their furnaces run down until they require new bricks, and this is where we can find a large waste of coal. The furnaces are gradually burned out, the lower half enlarging from day to day, as shown in Figure 3. This burned out space will take up anywhere from 10 to 50 lbs. of extra coal per heat, depending upon the

condition and size of the furnace that is being used.

Practically all of this coal may be saved if a rule is strictly adhered to to repair the furnaces once a week. In some cases this furnace repairing is done in a haphazard way, but there are a number of details which, if followed, will result in a much more satisfactory job.

First, let us take the material to be used, which is furnace cement. Some foundries seem to be satisfied to use any kind of so-called furnace cement or clay, but let me state right here that this is a mistake. A good furnace cement is absolutely necessary to make a good repair, and in this case the best is none too good, and in the long run it is the cheapest. A cement for this purpose must consist of a reasonable amount of graphite to withstand the terrific heat, stoking and poking of the furnace tenders.

To prepare—It should by all means be wet down the day (a week is better) before it is to be used. To each pailful of water a heaping tablespoonful of common salt should be added. When ready to repair, take a sharp crowbar and knock all the projecting clinkers off of the sides and see that all the fine particles of old dry cement and dust, which is usually found on the bottom plate and in the cracks is thoroughly removed, otherwise you will have a poor foundation for the cement to rest on. Instead of wetting the walls with the usual water take three pailfuls of water to one part of cement and one spoonful of salt to each pailful of water and stir well.

To apply—This mixture should be applied with a hand brush, then put on the cement with your hand, not a trowel, wipe into the cracks as hard as possible. The cement should not be used as wet as mortar. Some foundry men wonder why after cementing a furnace and starting a fire to dry, the cement will open up and show long cracks. The reason for this is that the cement used is too wet. Use just enough water to make the cement hold together and smoothen out the surface with as little cement wash as possible and dry out with a slow fire.

If these suggestions are followed it would be an easy matter and take very little time to keep furnaces in first class condition all the time. The bricks will last three times as long and the coal bills will be smaller.

PROGRESS OF ELECTRIC METAL MELTING FURNACES

A Resume of the Various Types Being Built and in Use.

In view of the large number of inquiries submitted to The Metal Industry for information relating to the present status of electric furnaces for melting metals, the following summary taken from a paper presented before the recent convention of the American Institute of Metals at Boston, Mass., by Dwight D. Miller of the Society for Electrical Development of New York, will prove interesting.

"The furnaces that are in actual commercial practice for handling copper zinc alloys include:

1. The Ajax-Wyatt Furnace—Controlled by the Ajax Metal Company, Philadelphia, Pa.
2. The Foley Furnace—Controlled by Charles B. Foley, Inc., 170 Broadway, New York City.
3. The Baily Furnace*—Controlled by the Electric Furnace Company of America, Alliance, Ohio.
4. The Rennerfelt Furnace—Represented by Hamilton & Hansel, 17 Battery Place, New York City.
5. The Snyder Furnace—Controlled by the Industrial Electric Furnace Company, 53 West Jackson Boulevard, Chicago, Ill.
6. The Hoskins Furnace—Controlled by Hoskins Manufacturing Company, Detroit.

The Ajax-Wyatt furnace has been briefly referred to in the early portion of this paper, and since Mr. Clamer of the Ajax Metal Company, has prepared a paper on the furnace for presentation at this meeting I shall not go further into the subject, except to say that it is best adapted to 24-hour continuous operation handling the same alloy.

A list of furnaces installed follows:

1. American Brass Company, Waterbury, Conn. 2-60 kw.
2. Bridgeport Brass Company, Bridgeport, Conn. 28-30 kw.
3. Waclark Wire Company, Bayway, N. J. 1-30 kw.
4. Washington Navy Yard, Washington, D. C. 1-30 kw.
5. Browns Copper and Brass Rolling Mill, New Toronto, Canada. 1-30 kw.
6. Stamford Rolling Mill, Springdale, Conn. 1-60 kw. (on order).

*A description of the Baily electric furnace appeared in The Metal Industry for September, 1917.

The Foley furnace was invented by Charles B. Foley and while patent applications have been made the writer is unaware of any patents having been issued up to the present time.

Mr. Foley states that there are four furnaces at the Bristol Brass Company, Bristol, Conn., one of 1,000 pounds capacity in operation and three of 3,000 pounds capacity each about to start up. As this statement was made in the last part of June the three large furnaces are probably in operation by this time.

There seems to be very little data concerning this furnace except that it very closely resembles the Ajax-Wyatt furnace in both construction and method of operation. Repeated attempts to get specific data as to the construction, operation and performance of this furnace have been of no avail.

The Baily furnace after establishing its position for the heat treatment of metals has now likewise established itself firmly for the melting of alloys and metals in the non-ferrous field. Among its strong points, two stand out prominently, i. e., its simplicity of construction and reliability of operation—points which are amply substantiated by the experience of those companies which have had it in use for some time.

At the Lumen Bearing Company, Buffalo, N. Y., they melt copper, Lumen metal, phosphor and manganese bronze in a Bailey furnace. They charge 600 pounds, consisting of scrap and ingot. Short test runs on both Lumen metal and phosphor bronze far from ideal conditions resulted in a consumption of 12 kw.-hours for Lumen and 22 kw.-hours for phosphor bronze per 100 pounds. They state, however, that as soon as they get running ten hours a day six days in the week, they expect to reduce these figures to 10 and 17.5 kw., respectively, based on making the hardener, used with Lumen metal and forming 28 per cent. of the melt, separately in a crucible.

The Lumen metal is poured from 1250 to 1600 degrees Fahrenheit, the phosphor bronze at approximately 2200 degrees Fahrenheit. The heats average about one hour, so that eight or nine heats can be made in a ten-hour day, according to conditions. The metal loss will vary between 2½ and 3½ per cent. for the Lumen metal, the test on the phosphor bronze showing 2 per cent.

INSTALLING A COST SYSTEM IN A BRASS MANUFACTURING PLANT*

An Article Dealing With a Most Important Factor in Metal Production.

Written for The Metal Industry by P. W. Blair, Mechanical Editor.

The brass manufacturer who knows his costs in the manufacture of his products casts aside all doubt and guess work and then can intelligently price his product in fair competition. As the human element in every plant encountered is different I do not desire to put myself on record as endeavoring to establish any hard and fast rules to be followed, but offer the results of my experience from the most economical view and cost of operating a cost system.

The three elements entering into the cost of manufactured goods are material, labor and overhead expense. Inasmuch as true cost accounting consists of a logical procedure in the matter of working out details, the subject of materials is first to be considered. Material consists of two general classes, which are direct and indirect material. That known as direct material is the substance from which products are made and which can be conveniently charged against the particular order, job or article manufactured. Indirect material is that which is used in the manufacturing, but enters in such a manner that it cannot be conveniently charged to the product because of the great amount of detail and labor involved. Items that are considered under the head of indirect materials are waste, small tools, emery cloth, belting, and so forth. The cost of material should include the purchase price, freight and cartage and any other expense required in the delivery and all charges accruing up to the point of manufacture.

The cost of direct materials should be charged in its entirety, waste or salvage not being considered, except in such cases where the value of the waste and salvage is of such importance that they can be taken into consideration. Indirect materials should be charged to overhead expense. The value of materials is of vital importance to the cost entering into the manufacture of an article and should be so handled that the correct value is attached to the same. So that in figuring the current manufacturing cost the materials should be priced at actual cost, that is, material purchased at one price should be taken out at that price before using the price at which the next succeeding lot is taken in.

However, where the value of material used on an order is small or where the material is of a class which fluctuates little in value from time to time, average cost may be used. Materials when purchased should be covered by purchase orders placed on file and checked against the materials upon its receipt, an entry being made on the stock card or inventory record. Where convenient to have a storeroom or warehouse the materials should be placed in bins, racks or shelves, suitable for storing so that the different departments can draw on them according to their needs. When such materials are used or needed for manufacturing purposes, a requisition for their withdrawal should be issued on the store-keeper and this requisition should be signed by some one in authority in the department the materials are to be used. The requisition should then be placed on file for entry on the stock card or inventory record, and at the end of a stated period the balances shown by the stock or inventory record should agree with the quantity on hand in the storeroom or warehouse.

Concerns that have not the convenience of a separate stock room should assign a responsible person to receive and keep the material and later check it out against requisitions which should cover pre-determined quantities for each job. This is the only system that can be employed to cover the cost of material entering into each job. The method employed in storing material in each individual department is entirely wrong, as it does not allow a check to be kept on the stock and employees indiscriminately help themselves at times.

The second and most important element is labor and this, like material, is divided into two classes, one of which is called direct, and the other indirect. Direct labor is that which is applied directly to the job and can be so charged. On the other hand, indirect labor is that which cannot be called or definitely allotted to a particular order, but must be charged to overhead expense, either proportionately to each department or in its entirety to general expense. Items of indirect expense are superintendency, oiling machinery, repairs, shop cleaning, etc.

There are various methods of promptly recording labor in its direct applicaiton to jobs, one of which is where the workman makes a record of the time he spends on each job and another is where a department clerk or a foreman records the time he spends on each job, or another is where a department clerk or a foreman records the time of the workman either in pencil or by the use of a time stamp. The cut shows a daily chart for recording time which includes all the departments of a brass manufacturing concern, beginning with core-making and molding and covering every operation the goods pass through until shipment. This is one of the simplest and up-to-date forms that has been devised to determine the actual cost of labor in manufacturing brass goods.

The aggregate time distributed over the various orders or part numbers must agree with the workman's time as shown by the pay-roll record, either daily, weekly or monthly. As the time is frequently used as a basis for the distributing of the indirect expense, too much stress cannot be put on the importance of accurately recording the time spent on each job or order. After it has been determined that the record of time is correct, the items should be posted to cost sheets according to the various orders or part numbers.

The third item of expense is that of overhead and is the one most difficult to charge definitely. All charges that cannot be definitely allotted become overhead expenses. The totals of the various overhead accounts should be distributed to the departments to which they belong in proper proportion as may be determined.

All charges should be closed out and costs ascertained monthly, as experience has shown that six month or year periods are too long to wait to compute accurate costs. If conditions require remedying right away they should be corrected and not left until six months or a year later, as the concern may pass into the hands of a receiver by that time. For the purpose of efficiency it is necessary to know as near as possible the actual conditions at the time of happening.

Administrative or selling expense is one of great importance and must not be confused with that of factory overhead expenses. The question comes up whether this is of sufficient importance to receive special attention or small enough to be merged with the general overhead expense.

Good results should not be expected immediately, for the full benefit of a cost system cannot be realized until

*A companion article to this was published in The Metal Industry, January, 1917

Date 1-15-18. **Workman** JOHN SMITH. **Check No.** 125. **Rate** 32½ CTS. PER HR.

Part No.	Pat. No	Name.	Customer.	Schedule.	Op. No.	Time Start.	Time Quit.	Time Elap'd.	Completed.	Rejected.	Defective.	Inspector.
7531	....	Bonnet	....	....	1	7 a.m.	11:30		355	3	2	J. H.
7531	....	Bonnet	....	....	2	11:30	5:30		350	2	1	
7531	....	Bonnet			3							

Part No.	Core Making.	Molding.	Grinding.	Turn.	Form.	Thread.	Bore.	Center.	Champer.	C. Sink.	Cut.	Drill.	Face.	File.	Knurl.	Mill.	Neck.	Ream.	Slot.	Tap.	Chase.	Broach.
7531						√																
7531					√																	
7531																						

Part No.	Buff.	Polish.	Col. Buff.	N. P.	Assemble.	Wrapping.	Packing.	Mach. No.	O. K. by	Cost pr. C.
7531								96	P. W. B.	
7531								96	P. W. B.	
7531										

it has been in operation for some time. In the manufacture of brass goods there are so many parts employed of varied characters and these parts can be used on different classes of goods, thus making it rather complicated to check up. The simplest and most economical method is the installation of a cost system along the lines submitted above although they have only been briefly described, for the question covers a large field. The above is taken from actual experience.

There have been a number of cost systems installed in brass manufacturing establishments within the past few years that were rather intricate and complex, and the cost of operating these systems was enormous and after being given a fair trial had to be abandoned. I hesitate to go into the construction of a system of accounts, as the average person with a statistical turn of mind can arrive at fairly reliable results independently of the general accounts, and this is out of my line. On the other hand, any bookkeeper with a little thought can devise accounts that will interlock with an accurate cost system.

The following list of accounts might be used in a concern manufacturing brass goods:

INDIRECT LABOR

Clerical	Stock handling
Supervision	Purchasing
Building service	Engineering

MISCELLANEOUS

Power	Gas
Light	Water
Coal	Rent

MISCELLANEOUS FACTORY EXPENSES

Machinery	Furniture and fixtures
Tools	Depreciation
Maintenance	Machinery and tool expense
Machinery	Furniture and fixtures
Tools	Fixed plant
Repairs to finished parts	Fire protection

SCRAP

Purchasing expense	Executive expense
Selling expense	General expense

TINNING CAST IRON.

The only satisfactory method of tinning cast iron is by the hot dip process. I know of no method whereby the insides of these goods can be tinned without tinning the outside also.

Malleable and wrought iron, steel and copper can be tinned by contact, but cast iron besides requiring special preliminary preparation also demands immersion in the molten tin for a period varying from ten minutes to one hour, depending on the quality of the casting.

If a bright silvery finish is desired, special tumbling barrels to be operated under gas pressure are necessary for the preliminary preparation. If a dull coating will answer, a sand blast may be used. Two kettles of tin are necessary, one for rough tinning, and a smaller one for the finishing operation.

The cost of apparatus depends on the size, shape and quality of the goods, and the finish required, and might run anywhere from $2,500 to $5,000, at the present high prices. The apparatus is all special and has to be built to order. Each cast iron tinning proposition is a problem by itself, and unless so treated will prove an expensive one, as methods that will work satisfactory on the castings from one foundry will not work at all on those from another whose product is apparently identical. I have sometimes had to study the foundry practice back to the melting of the iron in order to find a way to make the castings take the tin properly.—C. V. H.

SOME USES AND PROPERTIES OF NICKEL SILVER AS APPLIED TO THE OPTICAL TRADE

An Article Dealing with the Mechanical Treatment of This Important Alloy.

Written for The Metal Industry by G. C. Holder.

The uses of a nickelized Muntz Metal or nickel silver are varied, mainly because of their strength and resistance to corrosion.

The alloys in use in the optical trade, especially those applied to the manufacture of spectacle frames, must, of necessity, be the best, because of its ability to withstand the mechanical treatment necessary to bring it into shape for such purposes. Not only is the shape a factor, but the finished articles must have the necessary temper or spring in order that the frames have a permanent set. Especially is this true of the part of the frame called the temple, the temple being that part of the frame connecting the lens and looping the ear.

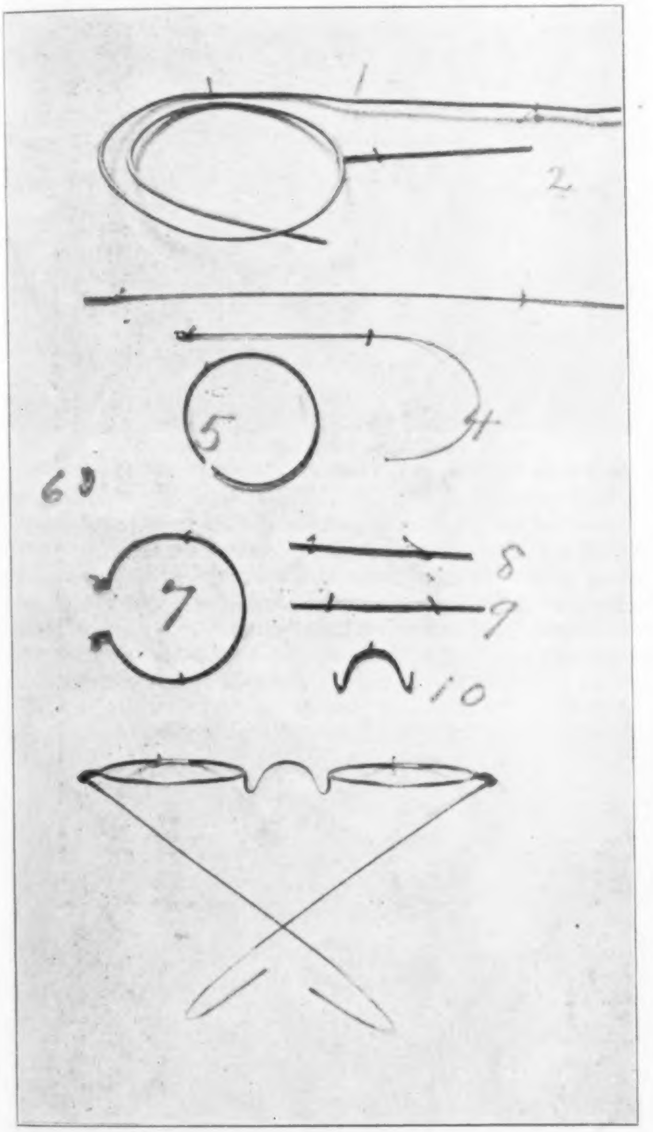


FIG 1—OPERATIONS INVOLVED IN MAKING A SPECTACLE FRAME.

No. 1, Original Wire as Received; No. 2, First Reduction; No. 3, Second or Final Reduction; No. 4, Temple Curled; No. 5, Grooved and Curled Eye Wire; No. 6, End Piece to Be Attached to the Eye Wire; No. 7, Finished Eye Piece; No. 8, First Operation on Bridge Wire; No. 9, Second Operation on Bridge Wire; No. 10, Finished Bridge; No. 11, Assembled Spectacle Frame.

The making of spectacle frames at first glance may appear easy, but when some 200 operations are necessary (in gold frames) from the time the gold is received in bullion to a finished product, it will naturally cause one to pause and think of the wonderful system of manufacture.

As said before, the metal must be of the best quality, and, as it is expected, different combinations of nickel silver are used for different purposes. Not only are different combinations used for different parts, but also for different grades, depending both upon the quality and style.

The alloy of nickel silver is received at the plant in the form of wire and flat stock. The content of nickel designating the grade of nickel silver and the amount of reduction from the annealed state the point of hardness. The wire, if of satisfactory diameter, as received from the mill, is reduced to the diameter of the temple by one reduction and sometimes in two; not only is it reduced, but the tip is also placed on the temple on the same operation as reducing. The wire, when once started on its reduction is not annealed, only in the case of two reductions is the tip slightly annealed. The diameter of the wire generally is .075, whereas the finished product or diameter of the temple is .026, making, roughly, a reduction of the material of 65½ per cent. One can, therefore, readily see the amount of mechanical work the alloy is subjected to. Sometimes, as previously stated, the material is reduced from .075 to .035, and then to the required diameter of the temple.

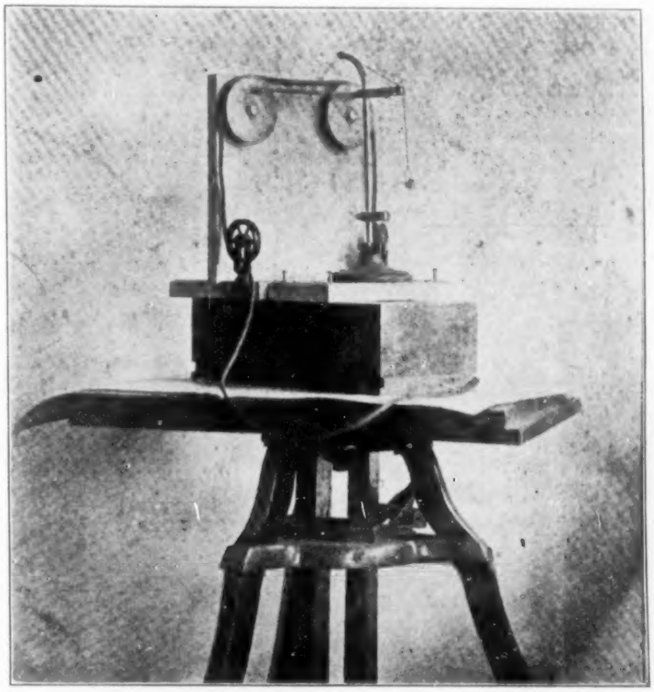


FIG. 2—APPARATUS USED FOR TESTING EYE WIRE.

The method of reducing is done by swedging, and, therefore, more mechanical work is done on the wire than in the case of drawing or extruding. In the case of swedging, the material is forced against a revolving die, and at the same time, as the die revolves, there is also a hammering produced by the dies coming together. One can, therefore, readily see the number and different

kinds of mechanical treatment the material is subjected to. In this case, as well as all operations in drawing or producing mechanical work on non-ferrous alloys, the speed of the machinery, as well as of the dies, have an important bearing. The speed of the automatic machine is especially important. If, for example, the rate of feed-

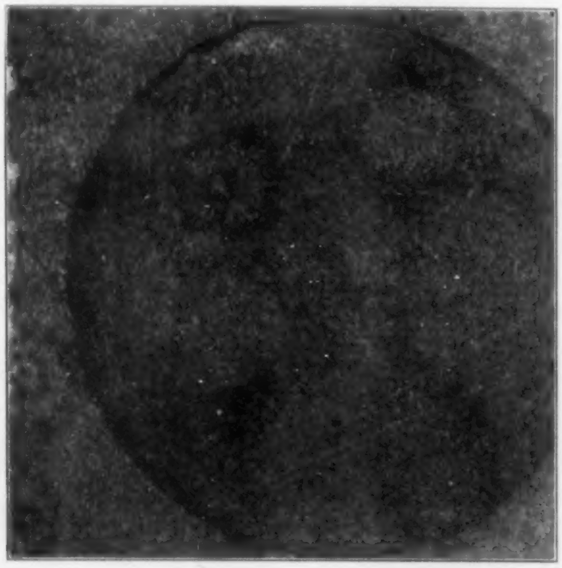


FIG. 3—CROSS SECTION OF A TEMPLE WIRE IMPROPERLY DRAWN SHOWING CURLED STRUCTURE.

ing of the wire is too fast for the number of revolutions produced by the head of the machine holding the die, the structure of the material will be twisted, which is shown not only by means of the micros of the cross section, but also externally the waves can be seen. Then, too, the construction of the die is important; if in this case the die is too short or the distance from tapering part to the finished part of the wire is not long enough, or the change from the sloping part of the die when the metal enters

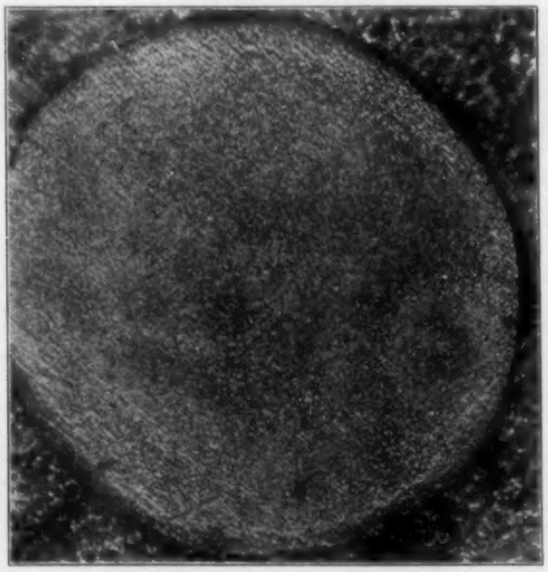


FIG. 4—CROSS SECTION OF PROPERLY DRAWN WIRE. NO CURLED STRUCTURE.

the finished part is too abrupt, you will then have the same characteristics exhibited in your finished temple as you can produce by means of pliers on a piece of wire. That is, indentations or kinks will be made, which may not show themselves until the material is placed on the curling machine.

As necessity is the mother of invention, so was the method of testing the spring of the temple, as at first applied in the works. While the method may not be accurate, it gave the men an idea or rather a comparative result relative to the kind of output. The straight temple was taken and grasped at the butt end or heavy part, the other end or tip was taken and bent so that both ends touched each other, the tip was then slowly released, the amount of permanent set taken was then compared with

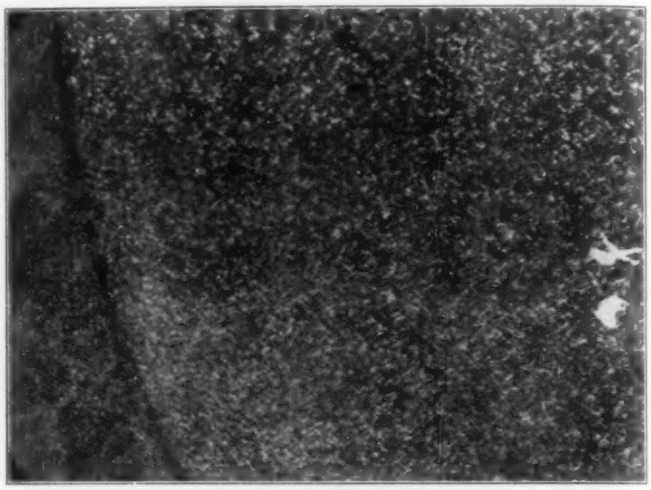


FIG. 5—NO. 25 WIRE .062 DIAM., 25 PER CENT. NICKEL SILVER, .018 HARD. MAGNIFIED 225 DIAM.

a standard that was felt to be a good example of workmanship. However, the above test did not satisfy the want, as it did not show the permanent set after the curling of the temple, so the following test and apparatus was devised. The respective temples were clamped into a specially devised apparatus, the tip of the temple was fastened to a small chain, the chain in turn fastened to a rod having the same motion as an eccentric having 109 R. P. M. The temples were straightened and released alternately, each temple was subjected to the same treatment for a space of 5 minutes. The different position of

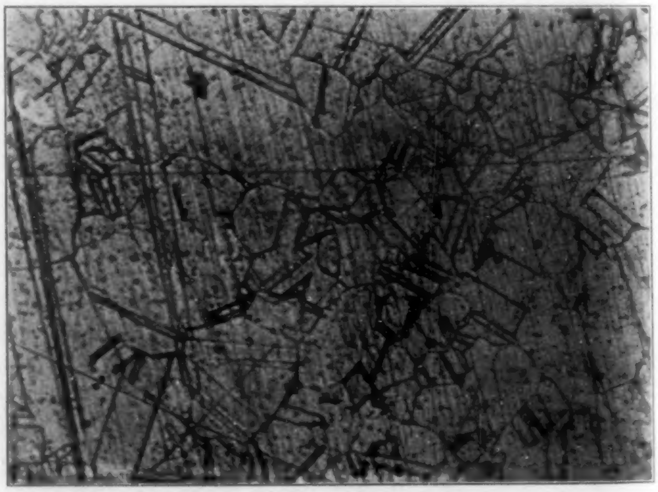


FIG. 6—NO. 25 NICKEL SILVER WIRE ANNEALED FOR 72 HOURS AT 700° C.

the tip, before and after, was measured and recorded.

The amount of mechanical work placed on an alloy without annealing should not exceed the elastic limit. As is well known the crystal size of the alloy depends upon the amount of work done. Therefore, the more mechanical work done on an alloy the smaller the grains and

the harder and stronger it is, but the individual grains should not be destroyed. When the individual grains are broken up, meta-stable equilibrium is established, and actual figures on test have established the fact that a well annealed and well worked alloy has better physical properties than a cast alloy, due to an absence of equilibrium. The characteristic structure of a nickel silver alloy is the cored structure and that makes itself evident in the cast specimen as well as in the extremely worked alloy.

The alloy composed of copper, nickel and zinc is not a formation of compounds, but consists of a single homogeneous solid alpha solution, and upon annealing it is softened and crystallizes, which is characteristic of an alpha alloy. The establishing of an equilibrium in nickel silver is attended to with difficulty due to the content of nickel which is rather slow to diffuse, but when once started it is attended with the growth of crystals so well known in the alpha solutions. The property of annealing evidences itself very readily, and as far as actual working qualities are concerned the establishment of an equilibrium does not seem to be necessary, however, when the question of temper or springiness arises it is better to have an equilibrium established, and not to rely upon over-straining, and then relieve the overstrain somewhat by annealing, as that condition will most certainly lead to an erratic product. The question of impurities enters largely. Generally iron is considered an impurity, however, it forms a solid solution and adds to the physical properties, inasmuch as it gives it a whiter appearance and adds to its strength. Manganese has somewhat the same effect as iron, aluminum likewise forms a solid solution. Tin and antimony do not enter into a solid solution with a nickel alloy and, therefore, should be avoided. Tin gives a yellowish tinge to the alloy. Lead is merely held mechanically and is only used intentionally for material to be used in the manufacture of small screws on automatic machines.

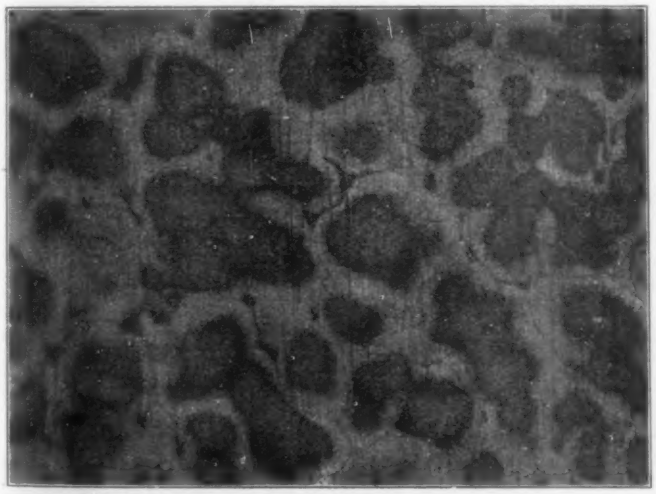


FIG. 7—CAST NICKEL SILVER WIRE. CU. 61.20, NI. 23.22, ZN. 12.47, AL. 3.13 PER CENT. MAGNIFIED 225 DIAM.

The bridges of the spectacle frames are made from wire, reduced at both ends, then flattened, then annealed, then pressed to its desired shape. The eye wire is also made from wire, reduced to necessary gauge, then annealed, then passed through the rolls placing the grooves therein. The end pieces or the parts connecting the temples to the eye wire are blanked from annealed flat stock, and carried through various operations such as shaping, squaring up, and slotting. The bridge and end pieces are soldered on electrically. The frames are assembled, and receive an inspection and after having passed are cleaned and ready to be packed and shipped.

The preparation of micros was done as follows: The samples were embedded in low melting soft solder and the usual polishing proceeding was done, they were then etched with ammonia, sp. gr. 90 by means of a polish attack.

A few words as to the micros. No. 3 shows the cross section of a temple improperly drawn; No. 4 shows the cross section of a properly drawn wire or temple. The curling structure shown in No. 3 is what is termed faulty, and denotes either improper working qualities or improper mechanical working.

Sometimes when wire is in the condition as shown by Fig. 3, it seems to be beneficial to give it a superficial annealing. A series of tests were run, the samples were annealed at 350 degrees C. for five minutes and compared on the vibratory machine with unannealed specimens.

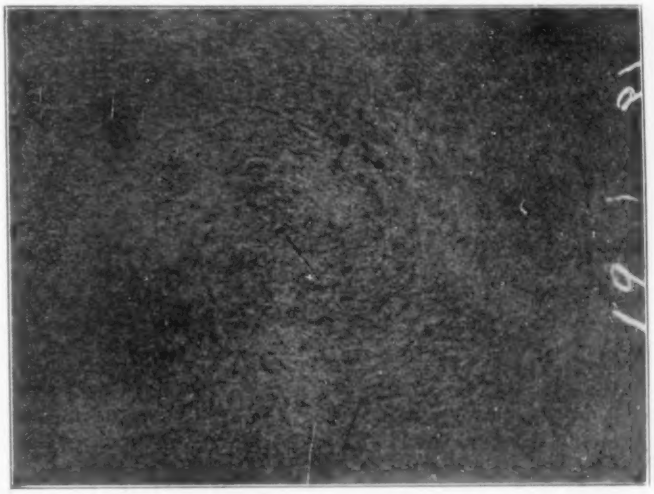


FIG. 8—TEMPLE WIRE, 25 PER CENT NICKEL, HEATED AT 700° C. FOR FIVE HOURS. MAGNIFIED 225 DIAMETERS.

Distance of tip raised in vertical direction after test. Expressed in 32nd of an inch.

Temple not baked.	Temple baked.
19	14
25	15
16	18
24	12
20	8
20	16
20.6 av.	14.0 av.

Distance of set of temple in horizontal direction before and after test, expressed same as above.

Temple not baked.	Temple baked.
10	10
12	10
8	13
10	10
12	6
13	12
10.8 av.	10.0 av.

The vibratory test did not show very great difference as far as the difference of set of temple before and after test in horizontal direction is concerned, but there is a great difference between the baked and unbaked temples as to the final set of the tip of the temple before and after test in the vertical direction. The same characteristics are noticed some times in steel wire, where superficial annealing seems to have a beneficial effect. However, it

is a poor practice to rely on that treatment in order to improve the physical property. If an equilibrium had been established at one time such conditions would not be met with. As will be noticed the micros of 25 per cent. nickel silver wire exhibit the well known cored structure, evidenced in extremely worked alloys as well as in the cast condition. The micro of a temple exhibit the same structure, only broken down more. The structure, therefore, lacks homogeneity, and does not show a very great difference between the original wire and finished product, which is the case, as a test of 25 per cent. nickel silver wire has given a tensile test of 120,000 lbs. per sq. in., whereas the temple made of the same stock having over 60 per cent. reduction, showed only a strength of 121,000 lbs.

The temple made from 10 per cent. nickel silver wire had an ultimate strength of 108,500 lbs. per sq. in., whereas the original wire had a strength of 90,553 lbs. per sq. in. A glance at the micros will show that an equilibrium was established, because of its crystalline characteristics.

Below are some characteristic mixtures of nickel silver.

The following mixture is used to make small screws or taps:

Copper	61.03
Lead	.59
Zinc	16.52
Nickel	21.14
Iron	.67
Silicon	Trace
	99.95

Material in use to make 25 per cent. nickel silver:

Temples	
Copper	57.51
Lead	Nil
Zinc	17.49
Nickel	24.54
Iron	.50
Silicon	Trace
	100.04

Composition of sheet nickel silver:

Copper	47.25
Lead	Nil
Tin	Nil
Nickel	25.90
Zinc	26.20
Iron	.65
Silicon	Trace
	100.00

IN THE BRASS FOUNDRY

PORTRAYAL OF WAR CONDITIONS IN ENGLISH METAL SHOPS, WHICH APPLIES EQUALLY WELL TO AMERICA.

WRITTEN FOR THE METAL INDUSTRY BY S. JONES.

The statement that "things will never be the same after the war" has been repeated so often that it has lost any meaning that may have been originally attached to it, but it is more than probable that things will never be the same in that important branch of engineering that is vaguely and comprehensively known as "the brass foundry." In most of these shops the work was formerly divided into two classes, known as yellow brass and gun-metal, and the variety of mixtures concocted under the cloak of these simple titles was positively bewildering. It is quite safe to say that, given a free hand, no two out of a hundred brass foundries would make up exactly the same mixture for a given purpose. Usually there was an element of profound secrecy in the production of sound castings, and the alleged secrets were jealously guarded. What really happened was that in each shop there was someone who from long experience or by accident had discovered that by using certain proportions of copper, tin, zinc, lead, aluminum, etc., and then melting and pouring the alloy under certain conditions, the results would be more or less satisfactory to all concerned. Few of these geniuses, or genii, realized that their successes, such as they were, had been based on well-known scientific principles. They would probably have scorned the suggestion, but they could not refute it. Then came the sudden and unprecedented demand for "munitions" in huge quantities, and the so-called expert brass founders found that in handling new mixtures or making alloys to stand up to certain tests their skill was at a discount.

If it were possible to ascertain the weight of waster castings turned out in the first rush of munition work the figures would be almost incredible. Add to this the thousands of tons of castings that were considered good enough in the foundry but were ignominiously rejected by inspectors of doubtful intelligence, and the incident begins to assume the proportions of a calamity. In one controlled establishment alone two months and a very considerable quantity of valuable metal were wasted in an endeavor to eliminate pinholes from a certain class of castings. It was an old-fashioned government shop and the alloys, the castings, and the specification were entirely new. There was no precedent, and consequently the results were lamentably different from what they had been accustomed to produce. Even the mathematical precision with which they had turned out certain classes of work for nearly a century did not help them. The official heads of the department, worshippers at the shrine of tradition, considered it distinctly *infra dig.* to seek advice outside their own sacred temple, but when in wild desperation they were compelled to do so they were put right in less than two hours by a man who had studied the science of brass founding intelligently, and who didn't care in the least what his grandfather did before him.

The foregoing is a single but true example of what was going on all over the country at the time, but such difficulties now seem to have been overcome by the judicious application of modern methods based on something more substantial than tradition and rule of thumb. More than ever before founders have realized that it is one thing to copy the ingredients and proportions from a pocket-book, and another to melt them down and produce a sound, homogeneous alloy. They have also learnt the value of accuracy in weighing and mixing, for whereas formerly a difference of one or two per cent. in the proportions was regarded as negligible, a fractional percentage is now known to be responsible for the difference between failure and success. The foundry chemist, once regarded as a necessary evil, is now a recognized authority, and with the co-operation of a more intelligent class of founders that have learnt valuable lessons from bitter experience during the last three years, the reliability of the work turned out from our brass foundries in future years will be above suspicion.

In making copper castings, or copper alloys, one of the greatest difficulties the founder has to contend with

is the prevention of blowholes in the castings. This is chiefly due to the oxidation of the copper, which at its melting point of about 1,090 degrees C. has a particular affinity for oxygen, which it absorbs from the atmosphere very readily. Unless due precautions are taken the result of this chemical affinity will be made manifest in spongy and worthless castings, or in the presence of red spots or "shots" of oxide of copper, which are extremely hard and liable to render castings wholly unfit for machining. It is obviously difficult to prevent a certain amount of oxidation during the melting process, but much may be done by keeping the surface of the molten metal covered with powdered charcoal, and, when the metal is ready for pouring, a deoxidizer may be added to further help in producing sound castings. One of the old "trade secrets" on which success in making sound copper castings depended consisted in stirring the molten metal with a large stick of green unseasoned wood. This had the effect of deoxidizing the copper, though the operator was probably not aware of it. This method is still adopted in many places at the present day, and in the hands of an expert it is fairly successful, but a more modern and reliable way of dealing with the problem is to use as a deoxidizer some element or substance of known chemical properties, and preferably one that will combine with the oxygen only, so that nothing that might be deleterious will be left behind by combining with the copper. This is especially necessary for electrical fittings, where the purity of the copper is of great importance. One of the most suitable dexodizers for such purposes is boron, which is better known in the form of its derivatives borax and boracic acid. Boron copper is now a commercial product, and is sold in the form of ingots ready for melting and casting. The boron is usually added in the form of boron sub-oxide, the amount varying from 1 to 1½ per cent.

The term "brass" is used rather loosely, but is generally assumed to include all copper-zinc alloys, or alloys in which the metals are the chief constituents. For brasses of a special kind a small proportion of tin is added, which increases the fluidity of the molten metal and produces a stronger casting. Lead is frequently added, in still smaller proportions, either to cheapen the cost or to produce soft castings that can be easily machined. Most brass founders have their own "special mixtures" for different purposes, and are very skillful in the production of sound castings, but many are liable to get adrift when they have to deal with a mixture that is new or strange to them. In making up a mixture to specification the principal things to bear in mind are that copper increases toughness and ductility, and zinc reduces them, while if lead is used the amount should not exceed 6 per cent., as if this proportion is exceeded there is a risk of liquation occurring, unless antimony is used to counteract it.

Alloys of copper and tin, or those in which these metals predominate, are known as bronzes, the most familiar of which is gun-metal. Some authorities classify gun-metals and bronzes separately, but in the foundry there is usually no such distinction. In the case of some well-known alloys the use of the term bronze is distinctly misleading. For example, manganese bronze and Tobin bronze are not bronzes at all. They are copper-zinc alloys, and as such should be classified as brasses; but custom is strong, and having been given the name of bronze they are always placed in that category. Castings made of phosphor bronze or silicon bronze are popularly supposed to contain small proportions of phosphorus and silicon respectively, but as a matter of fact it is very seldom that they contain even a trace of either. The elements referred to are certainly added to the mixture, but the object is to refine the molten metal and not to alloy with it. They have a powerful deoxidizing effect, and increase the strength of the metal by eliminating certain impurities and occluded gases. The phosphorus is usually added as purchased from the chemist, while silicon is added in the form of copper silicon, sometimes called silico-copper. In special cases ferro-silicon is used, the iron forming an alloy with the copper. The original gun-metal contained 90 per cent. of copper and 10 per cent. of tin, a composition that is practically identical with that of ancient bronzes from which tools and weapons were made, though in some cases these old bronzes contained a small percentage of lead. What is known as hydraulic bronze contains about 3 per cent. of zinc, and is an alloy that gives good dense castings suitable for pump barrels and high-pressure hydraulic fittings generally. In making up an alloy of this description the zinc should be melted first, then the tin added and the resultant metal cast into ingots or pigs, which can be added to the molten copper when making up the final mixture.

A knowledge of the melting points of metal is of great importance in the brass foundry, and in making up an alloy the metal having the highest melting point should be melted first, and the others added in the same order. Those which have a very low melting point should be added immediately before pouring. The melting point of tin, for example, is about 230 degs. C., and consequently in making copper-tin alloys great care is necessary to prevent the tin from volatizing at the melting heat of copper. Zinc melts at a temperature of about 420 degs. C., and as this is also considerably below that of copper the same precautions are necessary as when adding tin. The loss from this source cannot be avoided altogether, even under the best conditions, but with care it may be kept down to about 3 per cent., which must be allowed for in making up a mixture. Even today hundreds of castings are being rejected owing to ignorance of such elementary rules as these, and disgusted founders wonder why their metal will not stand up to the required tensile test. They have got the prescription right, but they don't know how to compound it.

NICKEL FINISH ON BRASS

To finish articles in nickel the following methods would have to be followed: The articles should be cleansed and bright acid dipped; then tumbled with steel balls and borax solution or with a dilute solution of platers' compound and water; or, if a high lustre is not required, the articles, after acid dipping may be dried out and then tumbled in leather scraps. Leather meal is preferable for many articles, but for your clasps the scraps would be the most satisfactory, on account of the fine leather becoming compressed inside the clasps which might prove difficult to remove. After tumbling, by one method or the other, the articles should be cleansed by the aid of hot alkali solutions, washing in water and the usual cyanide dips and rewashing in water. Then plate in a mechanical nickel plating solution from twenty to thirty minutes or more. The solution should consist of the following:

Double Nickel Salts	8 ounces
Single Nickel Salts	2 "
Sulphate of Magnesium	4 "
Water	1 gallon

For a still bath the following proportions may be used:

Double Nickel Salts	6 ounces
Single Nickel Salts	1 ounce
Sulphate of Magnesium	2 ounces
Water	1 gallon

For the mechanical barrel or tank a pressure of not less than six volts should be used, for still solutions three volts. The articles should be sufficiently bright when nickled and require only washing and drying.—C. H. P.

TINNING THE INSIDE OF BRASS CARTRIDGE CASES AND OTHER ARTICLES

A Description of an Economical Method for Performing a Difficult Task.

Written for The Metal Industry by Charles H. Proctor.

A recent inquiry for a method of tinning brass cartridge cases on the inside prompted the following short article.

There are at least three methods that can be used for this purpose and which can also be used as readily on steel as well as brass or copper. As cartridge cases are sometimes under the specified weight required the method of tinning can be used to increase the weight of the cases.

The first method consists of the regular way of coating the inside of the cases with a zinc chloride flux to produce amalgamation of the tin to the brass, then pouring molten straits tin inside and moving the cases rapidly so that the tin becomes uniformly coated over the entire surface. The tin is poured back into the melting pot as soon as possible and then a small amount of palm or cocoanut oil is poured inside the cases which are again revolved rapidly. The oil serves as a flux for the tin and the resulting finish will be a uniformly tin coated surface. The oils may be used over and over again. Iron tongs, covered with asbestos, should be used to handle the cases to prevent unnecessary scratching of the outside surface.

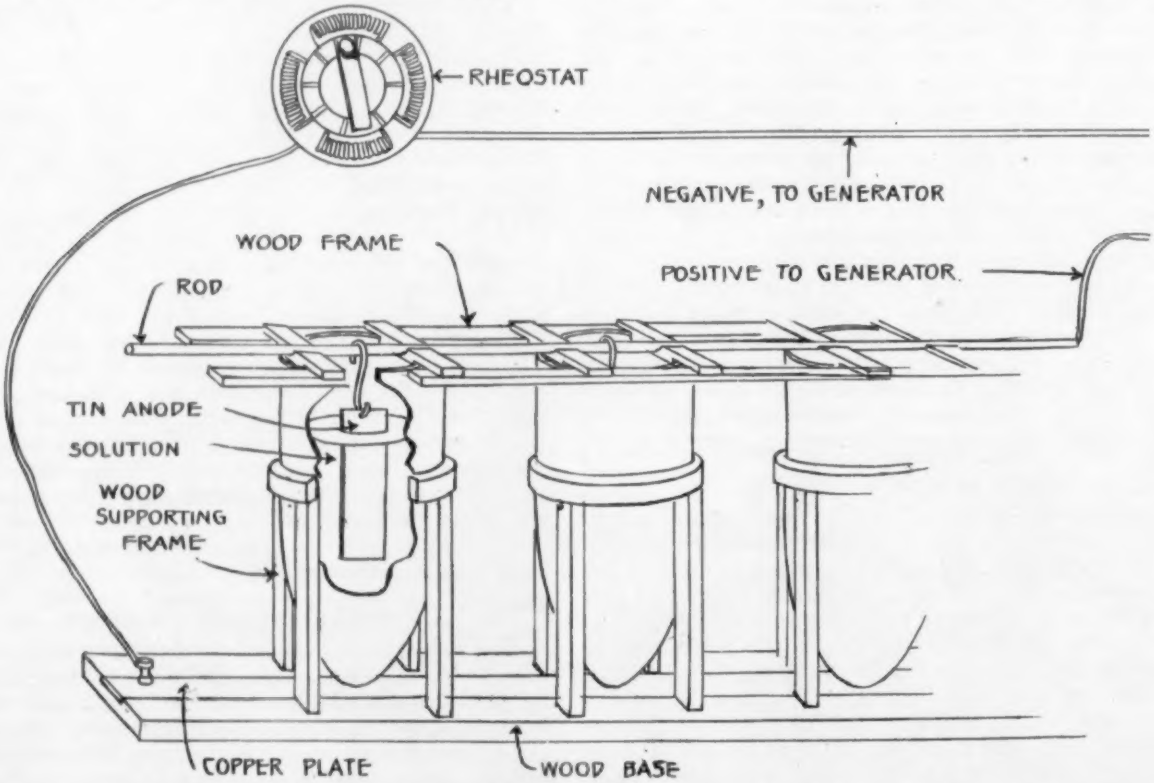
The second method is by the use of "Epicassit," and which was described by the writer in The Metal Industry for November, 1914. This method consists of using a finely divided tin or alloy of tin and lead mixed to a paste with an oil flux such as petroleum or a mixture of petroleum and palm or cocoanut oil. The paste is applied to the inside of the articles to be tinned by using a brush and then the cases are heated on the outside by means of a bunsen flame or similar methods until the melting point of the tin is arrived at. A very uniform coating of tin is obtained in this manner.

The third and final method is to electro-deposit the tin on the inside of the cases and is only used when the coating is to be used as a protective coating and not to increase the weight of the shell, although the tin deposits rapidly and could be used when the amount of tin to be deposited is not excessive.

The solution used for this purpose should be composed of the following:

Water	1 gallon
Sodium cyanide	1½ ounces
Tin chloride	2 ounces
Caustic soda	2½ ounces
Carbonate of lead	⅛ ounce

The solution should be maintained at a temperature of 120 to 160 degrees Fahr. and the voltage 2 to 3, while the amperage should be 5 to 8 per square foot of surface area. The best method for practical results would be similar to that shown in the sketch which consists of a wooden base with a strip of sheet copper running the entire length and acting as the negative connection. Suitable supports should be arranged to hold the shells in an upright position and a frame of wood equally spaced should rest on the top of the shells and used to support the positive pole with the anode connections. A number of cases could be plated at one time by using such a frame.



The time of tinning would only require from five to ten minutes, but a receptacle should be maintained for heating the tin solution as fast as each batch of cases are finished. The finished tin coating is an opaque white, and if a bright lustre is desired a steel scratch brush should be used and one made up from crimped wire is most suitable. As electro-deposited tin is soft it lends itself readily to polishing. Soft buffs should be used for polishing with a white lime composition as the polishing medium. A little kerosene oil can be applied to the buff wheel and it will be found that a clearer luster is produced.

POLYCHROMATIC FINISHES FOR JEWELRY

Instructions for Obtaining Some Decorative Effects.

Written for The Metal Industry by Oscar A. Hillman, Electro-Chemist, Attleboro, Mass.

It is impossible to conceive of a branch of decorative art where the production and harmonizing of colors is not of paramount importance. The jeweler whose business exemplifies the highest type of decorative art is always on the lookout for new methods of obtaining polychromatic effects.

The artificer of hand wrought jewelry obtains his multi-colored finishes by building up the piece of work from pieces of variously alloyed gold. After the pieces have been assembled the article is finished by chasing or engraving in such a manner that each little piece retains its individuality, without becoming more conspicuous than its neighbors.

Electro plating in various solutions in conjunction with applications of stop-off paint offers a wide range of possibilities, but, as the deposits are not much more than a flash color this method is almost exclusively used for finishing brass or the cheaper grades of roll plate jewelry.

EXAMPLES OF POLYCHROMATIC FINISHES ON JEWELRY.

Solid gold and high grade gold filled jewelry, medals, badges, etc., that are made from the same grade of stock throughout, present the most perplexing problems, as the work must be handled in quantities and the quality of the articles demands that the colors shall be able to stand the test of time.

Durable colors may be obtained by subjecting the articles to the action of heat and certain chemicals that remove one or more of the constituents of the alloy, thereby producing a substantial shell of a different color from the unaffected alloy under the shell.

At first glance this method of coloring may seem more like a laboratory possibility than a factory proposition, but a study of the underlying principles proves the process extremely simple and practical.

There is quite a difference in the methods of making the karat alloys, some firms using a larger proportion of silver than others, but as there is also a wide latitude in the alloys used for the colored golds, the same formulae can be used for coloring almost any alloy, provided the gold content is the same.

12K gold contains approximately 12 parts gold, 9 parts of copper, and 3 parts of silver. By removing the copper from the alloy the quality is raised to 18K and the alloy then consists of 6 parts of silver and 18 parts fine gold, which is the standard formula for light green gold.

The method of figuring the karat after one of the metals in the alloy has been eliminated, is as follows:

$9Cu + 3Ag + 12Au : 24$ (= 12K). After 9 parts copper have been removed the problem becomes:

$3Ag : 12Au :: \times : 24$ (= 18K).

The formula usually used for 14K gold is:

$7Cu\ 3Ag\ 14Au$. Removing the copper changes the alloy to: $3 : 14 :: \times : 24$ (= 18 6/7K, or 18.857 K), which is only ⅛ of one karat under 19K, which is the accepted alloy for bright green gold.

When the above alloys are heated to a cherry red and allowed to cool, exposed to the air, the surface copper is converted into the black and red oxides. By pickling in a hot pickle composed of one part oil of vitriol and six parts water the black oxide is removed and the red oxide is reduced to metallic copper. A second pickling in a hot mixture of one part nitric acid and six parts of water removes the metallic copper, leaving the green shell.

If only certain parts of the article are to be finished in green, the parts that are to be regular should be protected from the oxidizing action of the air by being covered with a flux of boracic acid before the article is heated. Another method of obtaining the two-color finish is to cover the articles with a green shell, then cover the parts that are to remain green with copal varnish and strip the green off the exposed portions by making the work the anode in a hot cyanide solution.

Some pleasing effects can be obtained by coloring articles green by the heat process, then removing parts of the green shell by mechanical means, such as lapping, polishing, or engraving. If 16K or 18K gold is to be colored green by the heat process and it is found after the copper is removed that the gold content is too high, the articles can be given a flash plate in a silver solution, then heated again to about 900 deg. F. The elevated

temperature causes an acceleration of molecular activity and the gold and silver becomes blended by sweating, even though the temperature is several hundred degrees below their melting points.

A combination of bright red and green can be obtained by heating the gold, then pickling in a cold pickle just

POLYCHROMATIC FINISH ON MEDALS.

long enough to reduce the black oxide to metallic copper, then give the articles a quick dip in molten nitrate of soda to which a small piece of lead has been added (a pennyweight of lead for each pound of nitrate). After the copper has been converted into ruby oxide by the melted nitrate, the parts to be red should be covered with copal varnish, after which the articles can be colored green by prolonged pickling.

Gold over 14K fine cannot be colored red by the above process unless it is given a preliminary flash plate in a copper solution and the copper sweated in under a flux. If it is not expedient to use a flux the same results may be obtained by heating the articles red hot, then plunging in denatured alcohol.

There are several formulae for acid dips and pickles that remove both the silver and copper from the surface of karat gold, leaving a durable shell of fine gold, but the great trouble with the majority of the dips is that they eat away all low karat solders, so the fine gold dips can only be used for very high karat gold or for such articles as medals, pendants, beads, etc., that are not soldered.

A quick method of producing the fine gold shell is to string the gold work on fine silver wire, then dip in 1/3 alum, 1/3 nitrate of soda, and 1/3 common salt melted together in a sand crucible. After a satisfactory yellow is obtained the work should be dipped in a strong cyanide wash, then finished as desired.

*The illustrations of polychromatic solid gold jewels and gold filled medals are furnished through the courtesy of the Robbins Company, Attleboro, Mass., a firm that enjoys the reputation of making the most exclusive line of badges and trophies in the country.

WORK OF THE BUREAU OF STANDARDS ON ELECTROPLATING *

Abstract of Address Delivered at the Philadelphia Branch of the American Electroplaters' Society, November 17, 1917.

By William Blum.

Under the present emergency conditions it has not been possible for the Bureau to make rapid progress upon any extended fundamental investigation of electroplating problems. However, in connection with demands from military agencies for information and specifications regarding the various rust-proofing processes, numerous applications of plating have received consideration. Of these the most important are copper, nickel and zinc plating, all of which are being studied to some extent, as a part of the investigation of protection against corrosion.

Three phases of work included in this investigation apply to electroplating as well as to the other processes such as hot galvanizing, sherardizing, etc., viz.:

1. The resistance to corrosion afforded by the various processes.

In this connection both exposure and accelerated tests for corrosion will be employed. The accelerated test most commonly used, viz., exposure to saturated salt spray, is being studied in order to determine the conditions, if any, under which it may serve as a standard test. A large number of pieces of sheet iron are being treated by the various plating and coating processes in commercial plants for use in these corrosion tests.

2. The effect of the various operations upon the physical properties of the steel, e. g., the possible embrittlement of the steel during pickling or plating. Such information will be obtained by physical testing of a large number of rods of heat treated steels of various composition, after they have been subjected to the various operations involved in the different plating or coating processes.

3. A study of the best methods of testing the thickness, distribution and structure of the deposits, with a view to preparing such specifications as will insure satisfactory commercially obtainable products. In general, it is expected that such specifications will be based on quality and performance, e. g., a certain average or minimum thickness or weight of coating, and resistance to some test such as the salt spray test. It does not seem practical nor desirable at this time to specify the details of the processes to be employed, e. g., the composition of solution, current density, etc., used in plating operations. By leaving such details to the operators, opportunity and incentive is furnished to them to effect improvements or economies in their processes.

Parallel with the investigation of requirements and specifications, it is however expected to devote as much time as possible to the study of the effect of various conditions of operation upon the properties of the deposits. From such studies it is hoped to obtain information which will be of assistance to platers, e. g., in advising them as to what conditions will probably yield results that will meet the requirements for various classes of work. Among the latter may be mentioned airplane and motor truck fittings, and parts of shrapnel or other projectiles.

In connection with this investigation the bureau will be pleased to receive information or suggestions upon any of the above points, and to furnish such information as may be available at any time. It is expected that whenever the results or requirements warrant, tentative specifications will be suggested to the appropriate government agencies, even though some time must elapse before detailed results can be published.

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FACTORY PRODUCTION COST

How the Problem is Solved in a Large Metal Manufacturing Plant.

Written for The Metal Industry by Frank O. Vance.

The subject of factory production costs is not as complex as it may appear to be, as the principles are the same whether applied to a factory manufacturing a line of brass goods or silverware, differing only in the details of manufacturing, of which it is absolutely essential that the cost man of each plant be perfectly familiar.

If the need of a system to determine cost was evident three years ago, its need since then has been more apparent, and the cost man, who has kept pace with the constant changing values during this period, has had plenty to do.

A cost might be compared to a chain of three links, and it is said of a chain it is as strong as its weakest link, so a cost is only complete and satisfactory when the data necessary to complete each factor of the scheme is available and properly applied.

FRANK O. VANCE.

No one of the factors are of greater importance than the others and a cost which shows with a fair degree of accuracy the material and labor cost and fails to take care of the overhead charges is impaired just to that extent. One has to but see the relation of this factor to the labor cost to realize its importance, yet it is on this point that many concerns are laying the least stress.

This is possibly so because it is to many an unexplored territory and like many other problems assumes unduly large proportions. The material cost may perhaps be well considered first. All materials are considered as they should be, as raw materials. Sheet brass is the finished product of a mill, but to the factory manufacturing a line of brass goods it is a raw material, so that the finished product of one plant often is the raw material of another.

There is generally one department in which most of the work is started. The foreman of this department receives an order for 5,000 shells, as this is a regular stock article which he has cut before he knows the width and guage of stock to use and also knows how much stock he must issue in order to cut the order.

We will assume that he will have to issue 5,000 pounds; he will probably in practice exceed this by say 200 pounds in order to be sure that the order is completely filled. When the order is cut, he will fill out a report of material for the cost department, stating the kind, width, guage and pounds used in cutting the order and give the number cut with any other information which might be used by the cost department. From this record the cost man prepares his material cost. He, of course, has only the gross material weight available as yet, the net weight will be determined later.

These reports must be issued by every department starting work; it does not matter whether the material be brass or silk, the report must be made out and forwarded to the cost department.

The way the material is bought determines the way the report reads; if bought by the pound, the report reads pounds, if bought by the sheet as tin, or by the yard as silk, or by the foot, the report reads sheets, yards or feet, as the case may be.

If a report has been forwarded to the cost department it is not necessary to forward another for the same article, unless some change is made in the construction of the article or the width and gauge of material are changed. However, it is good practice to repeat occasionally, it affords an opportunity for comparison and tends to eliminate errors.

The charge made for the gross material is either the market price of the material, at the time the cost is made, or the price paid which is, of course, found on the bill. As to which shall be used each must determine for himself; if the stock was bought when the market was low and the manufacturer had a large stock on hand, it is obvious that he could probably quote a lower figure than a competitor who did not happen to be so fortunate. Another problem may confront the manufacturer who has a mill where he produces some or all of his raw materials. Shall he charge the market price for the mill products or shall he charge what it cost him to produce?

It is assumed that the mill production cost is below the market price. If the market price is the value charged, then two profits are made, one first on the mill product and the second on the finished article.

If efforts are made to keep the labor and overhead charges as low as possible, why should not advantage be taken of this means to reduce the material cost as well.

However, the main points are that the gross material necessary to cut a given quantity, depending on whether the cost is made up in quantities of ten, hundreds or thousands, is furnished by the foreman of the department in which the work is started, and is made on suitable forms for filing for future use and also in proving, if need be, the work of the cost department. The value charged is either the latest market price, or the amount paid for the last quantity bought, or the cost to produce in the mill. We have now one of the factors entering into the material cost, but the weight of the finished article may be but 50 per cent of the gross weight, that is, 50 per cent is left in the factory and presumably in such a condition that it has a value. This value is either its market value as scrap or its initial value less the cost to gather it together and remelt and return to its original condition. Thus, the initial cost less the scrap value gives us the net value.

The labor reports are made out and forwarded by every individual who produces work. This includes foremen and helpers who may spend part of their time producing, and the remainder of their time is devoted to non-productive labor. The importance of having these reports made out by foremen and helpers may be readily understood when we consider that if, for

instance, it can be arranged so that say half of their time is spent in producing two things, are accomplished, first, they have produced work, and second, they have reduced the overhead charges by doing so. The labor reports should be so arranged that the work of making them out is but very little, and they should be as simple as possible and yet give all the necessary information.

Such a report would give the name of the department, and such data, as name of the workman, name and number of the article, and if a separate part, state its name, give the time spent and quantity produced and the number of pounds. This may seem like a great deal to put on one card, yet a card can be arranged to take care of all of this information and it ought not to take more than a minute or two at the most to fill in the data.

This card or record gives the cost department the information necessary to make a charge for a particular operation. The man's rate per hour is entered by the foreman or by the paymaster's department. From the record of quantity, time and rate, it is an easy matter to arrive at the cost. However, this is not the final use of the card. From the weight and quantity we arrive at the weight of the article, after any operation, so that we know the loss in weight at any time, and by taking the weight and quantity on the record of the last operation we have the net weight of say five thousand or more, which is decidedly more satisfactory, and if the record is correctly made out and the quantity and weight is correctly stated, is obviously more correct than the net weight determined by weighing one, or say half a dozen.

These records are all similar in form and wording. Change of color provides for daywork, piece work, refinish and repairs. The third and last factor is the overhead; this is a subject that is usually slid over as rapidly as possible and yet there is no real reason why this problem should not be faced and satisfactorily solved. Taking up each item of expense separately simplifies the task considerably. The greatest expense item is probably that of salaries and the expense of the Administrative and Executive Departments. The percentage method of applying this expense is the simplest and is open to no great objection. Its opponents cannot say that it cannot take care of every item of such expense, though the question as to its fairness may be questioned because some departments may bear more and some less then their proper share of this expense.

In applying these expenses on the percentage basis the total productive labor of the entire factory for a given period is taken, and the relation of the productive labor charge for each department for the same period is found, and this percentage is taken of the Administrative and Executive expense and charged to the department. This is assuming that the direct labor charge of the department bears a direct relation to this expense.

Foremen who may have two or more departments under their charge have their salaries and expense prorated on the same basis, taking the direct labor charge of one department and finding its percentage relation to the direct labor cost of all of their departments.

Taxes and insurance are taken care of by first finding the percentage relation of the area of a department to the total area of the factory, then taking this per cent of the value of the land and buildings and adding to the amount found the value of its machinery and equipment.

The power expense is applied by determining by tests the horse power used for a given period and its percentage relative to the total horse power developed for this period and this percentage of the expense charged to this department. In charging for heat the percentage relation of the area of a department to the total area of plant will give a basis on which to make this charge, the power account being credited with this amount.

The light expense is taken care of by determining the amount of current used for the period and its percentage relation found to the current developed for the period, and this per cent used as the basis of taking care of this item of expense.

These are items of Administrative and Executive expense peculiar to each plant which has not been discussed, but the main factors have been taken up and the smaller items should present no great difficulties.

The salaries of foremen and the wages of their non-productive employees are charged to their department, as are supplies, such as oil, waste, twine, paper; these are preferably passed through a store room and charged to the department when they are issued.

The expense of non-productive departments such as the store room, stock room, are charged to the departments benefited by them on the percentage plan. The products of the machine department, if the plant has one, if new machines are taken care of in the asset account, repairs and alterations are charged to the department for which the work was done. After the total indirect expense of a department is found its application to separate costs should be considered. Here the percentage method fails to give satisfactory results though it is quite generally used; the better plan is to take the total indirect expense for a given period and divide it by the total productive hour of the department, thus arriving at an hourly rate, which is, of course, subdivided into rates for fractional parts of an hour.

Multiply the direct labor charge expense in hours or minutes by the indirect expense of the department for the time given the overhead charge for the operation. For recording cost either the card or loose leaf system should be used; books are not adapted to this work.

A complete cost may consist of the cost of a number of parts if cards are used for recording. It will have on it the name and number of the article, the name of the part, the date on which the cost is made up, a statement as to the kind, guage, width of material, with the gross and net weights which are taken from the records and from which is worked out the net material cost of the article. The labor operations are entered in the order in which they were performed. The labor cost for the operations with its proper share of indirect expense, are entered on the line with the operations with any other data which may be required, such as weight of the article, after the operation, time spent on the job, man's rate for hour, etc.

When the card is completed the cost of this part is ready to be entered on the Summary Card, on which is entered the three factors of a cost, namely, material, labor and overhead; these are thus combined and we have a cost of a complete article.

COPPER BUSINESS IN 1918.

Never before in the history of the copper industry has the increase in any one year exceeded 150,000,000 pounds. The copper producers would seem to be assured of a gross business this year of at least $524,-000,000, and this assumes an average price of only 25 cents a pound, according to copper authorities.

NOTES ON THE CRUCIBLE SITUATION

From a Paper Read at the Boston, 1917, Convention of the American Institute of Metals. This Matter is Now Available for the First Time. Part Two.

By A. V. Bleininger, Bureau of Standards, Pittsburgh, Pa.

THE FIRING BEHAVIOR OF CLAYS

With reference to the behavior of a bond clay when heated to higher temperatures, several points must be noted. These are—the temperature at which the clay first becomes dense or vitrified, the temperature at which it overfires, and the point at which it shows evidence of fusion. The first point is of importance for graphite crucibles, since it is necessary that the clay become dense at a fairly low temperature in order that it may protect the graphite as much as possible from oxidation.

The overfiring point represents that condition at which the clay shows excessive vitrification and softening under pressure. Most clays at this point begin to evolve gases which cause the structure to become vesicular or spongy. This state marks the end of the usefulness of the clay by itself. It is true, of course, that the graphite increases the refractoriness of the clay to a considerable extent, but nevertheless, a clay in which this phenomenon is postponed to a high temperature is superior to a material overfiring at a lower point.

data are plotted against the temperatures either in degrees or expressed in cone numbers a curve will be obtained which shows the firing behavior of the clay very clearly. The vitrification temperature will be that point at which the absorption falls to a minimum, usually a value not exceeding 2 per cent. The overfired condition is indicated by a marked rise in the absorption due to the formation of a spongy or vesicular state.

AMERICAN BOND CLAYS

The question as to whether clays are found in the United States which approach the Klingenberg clay closely must be answered affirmatively. Whether these clays occur in deposits as uniform in general character as the Bavarian materials cannot be answered definitely. The search for a substitute of the Klingenberg clay as a whole has been somewhat disappointing and this is not surprising. To my mind it would be far more desirable to use a mixture of clays resembling the Klingenberg material, rather than try to find a single clay which

No.	Source of Clay	Per Cent. Water Content in Terms of Dry Weight	Per Cent. Volume Shrinkage in Terms of Dry Volume	Ratio Volume of Pore to Volume of Shrinkage Water	Time of Slaking 1 Clay 1 Sand Minutes	Apparent Sq. Gr. of Dried Clay	Modulus of Rupture of 1 Clay 1 Sand Lbs. per Sq. In.	Temp. of Vitrification Deg. C.	Overfiring Temperature Deg. C.	Softening Temp. in Cones
1	English ball clay.........	44.90	43.30	0.79	30	1.69	323	1100	1320	31½
2	Klingenberg, A. T.........	39.68	42.58	0.57	78	1.79	381	1125	1450	32
3	Klingenberg, E. T.........	50.66	55.05	0.56	108	1.70	363	1100	1450	32
4	Missouri	43.63	43.63	0.72	33	1.72	351	1175	1450	32
5	Kentucky	45.28	34.53	1.05	9	1.55	234	1260	1450	32
6	Ohio	25.30	27.92	0.83	9	1.94	309	1230	1350	30½
7	Ohio	22.08	24.46	0.80	8	2.01	281	1290	1400	31
8	Missouri	34.66	42.63	0.54	117	1.90	554	1175	1320	27
9	Illinois	45.16	45.35	0.65	54	1.67	341	1200	1450	32
10	Kentucky	50.85	46.80	0.71	37	1.57	362	1230	1450	32
11	Tennessee	44.73	35.27	0.97	27	1.56	282	1175	1450	32
12	Maryland	38.91	40.61	0.67	114	1.76	518	1175	1390	31
13	Arkansas	29.02	32.32	0.72	128	1.89	466	1475+	1475+	29
14	Illinois	40.98	38.81	0.75	45	1.66	262	1285	1475	32
15	Mississippi	31.39	31.36	0.81	55	1.81	326	1290	1450	30
16	English ball clay.........	40.33	39.85	0.75	41	1.71	389	1100	1425	32

The firing behavior of a clay is determined by making up a series of briquettes, about 2 in. x 1¼ in. x 1 in., placing them in a suitable kiln or furnace and drawing one or more specimens at different temperature intervals. It is necessary, of course, to maintain accurate temperature control by means of a pyrometer or by the use of standard pyrometric cones. In our laboratory it is customary to draw the first specimen at 1050° C. and from there on, every additional 25° C. up to 1500° C.

Upon removal from the furnace the briquettes are either covered with hot sand or placed in a small furnace kept at a red heat so as to avoid checking or cracking on cooling. When cooled, the specimens are weighed and then immersed in clean water, boiling under a partial vacuum so that the liquid will penetrate into all the open and communicating pores. It is then possible either to make a simple absorption or a porosity determination. For general work the former will suffice. It is made simply by dividing the difference in weight between the dry and the saturated specimens by the dry weight and multiplying the result by 100. If then the absorption

might answer the purpose. Since the German clay itself is by no means a perfect material, owing to its tendency to crack in drying and its somewhat deficient resistance to sudden heating and cooling, it should be our endeavor to find a combination of clays superior to it. This is especially true, owing to the fact that all clay deposits show more or less marked changes at different depths and as the mine or bank is being worked into. For this reason it would be well to follow the practice of the English potters who employ for their compositions a number of clays rather than only one or two. In this manner they are less subject to difficulties due to unavoidable variations and at the same time are in position to correct any deficiencies by the use of materials which show but little change, such as washed kaolin, feldspar, and ground quartz (flint).

In order to illustrate the properties of some of our American bond clays, data obtained in testing them has been compiled in Table II, which may be compared with that relating to the imported materials. Considering the great variety of clays found in the United States, it cer-

tainly does not seem reasonable that no materials should be available which could replace the Klingenberg clay. Indeed we can say that we have clays which can be made to answer the purpose and new deposits are constantly being found and developed.

Referring to the table, it will be noted that several American clays such as No. 12 approach the Klingenberg quite closely, but it may also be observed that by the use of mixtures the best results may be expected. Thus, it is quite apparent that a mixture of clays Nos. 4 and 8 should give better results than either one alone. Clay No. 12 would be improved by the addition of either No. 4, 5, 9, 10, 11, 13, 14 and 15, and vice versa. Similarly, the clays No. 6 and 7 would be improved by the last series of clays named. Where the refractoriness of a single clay or mixture needs building up, an addition of Florida or Georgia kaolin would bring about a remarkable change. In making mixtures of any kind, it is essential that the clays be blended intimately by mill grinding; otherwise, the best results will not be obtained. The addition of sand, say 8 to 10 per cent of the total clay and graphite mixture, will often improve the standing up qualities of the crucible.

In case one or more of the clays are already silicious, no sand addition is necessary, and in fact may cause trouble due to checking and cracking. Where a mixture does not become sufficiently dense at the furnace heat, the use of 3 or 4 per cent of potash feldspar will bring about the desired result.

In controlling the quartz and feldspar contents of the clays the so-called mineral analysis of clays may be of value which determines, though not with scientific accuracy, the percentages of clay-substance proper, quartz and feldspar. For rapidly estimating the content of fine quartz (sand) in clays the use of a small centrifuge with graduated tubes is sometimes quite useful inasmuch as the volume of these coarser clay constituents may be read off at once.

The clay proposition should, hence, resolve itself into the use of, say, four clays, intimately blended together which should constitute a standard batch, and which should not be changed except for good reasons. We then should forget to worry about the clays and let them alone, though we should inspect shipments carefully. By the use of plastic kaolin and finely ground feldspar and quartz we could then make such corrections as would seem desirable. Lack of refractoriness should be corrected by kaolin; lack of density or insufficient vitrification by the use of feldspar; and deficiency in resisting the pressure of the molten metal, especially in steel crucibles as evidenced by bulging, by the addition of quartz.

In making up crucibles with 55 per cent chip and flake graphite good results have been obtained by the use of 8 per cent sand and 37 per cent of a mixture of Maryland, Illinois, Missouri, and Kentucky clays, approximately in equal parts. Upon introducing Arkansas clay, which is very silicious, no sand addition was found necessary and the five clays were used in the proportion of 9 per cent of each. It is interesting to note that fairly satisfactory results, 17 heats in an oil fired brass furnace were obtained with the last mixture, but using electric furnace graphite in place of the natural.

The work done by us seems to indicate that in using American clays somewhat higher percentages of bond should be used. Thus, a brass crucible composition consisting of 35 per cent plastic clay, 45 per cent chip and lump graphite, and 20 per cent ground old pots might be changed to 35 per cent plastic clay, 5 per cent kaolin, 45 per cent graphite and 15 per cent old pot material. Similarly, a steel crucible mixture composed of 55 per cent graphite, 32 per cent plastic clay and 13 per cent sand, might be changed to 30 per cent plastic clay, 5 per cent kaolin, 53 per cent graphite, and 10 per cent sand. In tempering crucible mixtures with water, the softer the consistency, the better should be the development of the bonding qualities. If it were practically feasible it would be desirable to use so much water that the mixture would form a viscous liquid slip or slurry.

An interesting fact, developed in some work done in this laboratory in the treatment of clays might be promising from the commercial standpoint. In grinding soft lignite with water the latter assumed a dark brown color due to the suspension of very fine particles of carbonaceous matter. By using this liquid in place of the ordinary water, taking care to screen out all particles not passing the 120-mesh sieve, the bonding quality and toughness of the clay seems to be improved to an appreciable extent. This is somewhat analogous to the well known process of Acheson, depending upon the use of tannic acid to improve the plasticity of clays, but does not have the bad effects of this reagent in the drying of the clay.

The differentiation between crucibles used for brass and for steel melting as to composition is not yet as clearly defined as it might be. All agree, however, that the clays need not possess as low a vitrification temperature but a higher overfiring temperature and greater refractoriness when used for steel melting. It also would be presumptuous to say that we understand all the factors entering into the construction of the crucible body, nor do we understand clearly the various destructive agencies tending to shorten the life of the crucible. The subject is not as easy as it might appear to the uninitiated.

It is obvious that laboratory work along these lines is difficult to carry on without having access to a crucible plant, as the question of workmanship enters vitally into the testing out of the different mixtures. Much is yet to be learned. It is believed, however, that the future will show that the application of ceramic principles, so extensively applied in the production of porcelain and other clay products, are of service also in this connection. The American manufacturers of crucibles have been confronted by a serious situation and they have done well under the circumstances, rendered especially difficult by the prevailing strenuous industrial conditions. There is every reason to believe that they will continue to improve their product and still retain the use of domestic raw materials.

In the use of graphite crucibles it is quite apparent to the casual observer that the treatment to which they are subjected is often extraordinarily severe. In the first place it is doubtful whether the function of drying out the crucibles is properly understood. Graphite crucibles are not fired to a high initial temperature and hence retain a porous structure. In common with all other clay products not burned to vitrification the crucibles are hygroscopic, i. e., they greedily absorb moisture from the atmosphere, which is more difficult to expel than we generally realize.

Low fired clays differ widely as to their hygroscopic capacity and the temperature at which they release the moisture thus absorbed. At the same time the expulsion of this moisture requires considerable time. Therefore, it is not sufficient simply to keep the crucibles in a warm place, but they should be finally maintained for at least several days at a higher temperature, say 300° F. before being placed in the furnace. In Europe the crucibles on being taken from this kiln are sometimes covered with a waterproof coat, such as tar, or pitch dissolved in turpentine.

The preheating of the crucible just before putting into the heat for the first time, likewise, is often only too abrupt and hence the temperature change to which they are subjected too violent. The ideal method of handling the fresh crucibles would be to place them in a special furnace kept heated by the waste gases of the melting furnace, where the temperature could be brought up uniformly to somewhat below red heat.

HOW TO REPORT NET INCOME UNDER WAR REVENUE ACT

Some Expert Advice Designed for the Aid of the Busy Metal Man.

Written for The Metal Industry by Ralph H. Butz.

Many thousands of business men, whose incomes or profits were not taxable under the previous income tax laws, will this year be required to file reports of their incomes or profits, which will be subject to tax according to the provisions of the War Revenue Act of 1917. These reports must be filed on or before March 1, 1918.

It is the purpose to give in this article a number of concrete examples of the manner in which the business man's income or profits will be affected, and also to interpret the law in such a manner that he will be enabled to make a correct return of his earnings for the year.

The liability for taxes on incomes and excess profits is covered by Titles I and II of the War Revenue Act, and the provisions contained under these titles are applicable to corporations, partnerships and individuals.

In this connection the tax liability of corporations will be treated first. There are three separate taxes imposed on corporations, which are as follows:

1. Tax on Net Income.
2. Tax on Excess Profits.
3. Tax on Undistributed Earnings.

TAX ON NET INCOME

Under the law of 1916 a tax of 2% was imposed on the net income of corporations, and this provision still remains in force. However, the law of 1917 imposes an additional tax of 4% on the net income, as provided in Section 4. Thus the income tax for 1917 must be computed at 6%. In 1916 a net income of $50,000 was subject to a tax of $1,000, while in 1917 the same amount of net income would be subject to a tax of $3,000.

TAX ON EXCESS PROFITS

The tax on excess profits is the one from which the government will derive the greater portion of revenue. Many industries have been greatly benefited financially as a result of the conditions brought about by the war. The excess profits tax is to be levied on the principle that the industries which have been benefited through war conditions should therefore contribute a proportion of their increased profits to the government. However, the law as finally passed does not exempt a corporation or other form of business organization from paying the excess profits tax, whether they have or have not received any benefits from the war conditions. If a corporation had an annual net income of $100,000 during the pre-war period, and its annual net income for 1917 does not exceed this amount, it will still be required to pay the tax on excess profits.

The excess profits tax covers all earnings since January 1, 1917; so that the first taxable year ends December 31, 1917, and for which period corporations must file their returns. However, if a corporation has fixed its own fiscal year, then the taxable year for such a corporation is the fiscal year ending during the calendar year of 1917. The amount of tax payable will then be computed on the earnings of the corporation from January 1, 1917, to the end of such fiscal year.

There are a number of methods by which the excess profits tax may be ascertained, but the first method mentioned in Section 203 is the one that will be used by those corporations and firms whose invested capital and annual net income are definitely known. This method is explained in the following paragraphs, and a complete schedule with figures is given for ready reference.

Assuming a corporation with a capital of $100,000 having an annual net income of $50,000 for 1917. With these figures stated we may compute the taxes in the following manner:

SCHEDULE A

1. Net Income		$50,000
2. Deducting 9% of the capital The maximum deduction	$9,000	
3. Additional specific deduction	$3,000	12,000
4. Net income subject to excess profits tax		$38,000
5. Tax on amount of net income in excess of deduction and not over 15% of capital $3,000 at 20%		$ 600
6. Tax on amount of net income in excess of 15% of capital and not over 20%...$5,000 at 25%		1,250
7. Tax on amount of net income in excess of 20% of capital and not over 25%...$5,000 at 35%		1,750
8. Tax on amount of net income in excess of 25% of capital and not over 33%...$8,000 at 45%		3,600
9. Tax on amount of net income in excess of 33% of capital......$17,000 at 60%		10,200
Total excess profits tax		$17,400
Net Income	$50,000	
Less the amount of excess profits tax	17,400	
Amount subject to 6% income tax	$32,600	1,956
Total taxes		$19,356

Items 2 and 3 in the above schedule show that a deduction of $12,000 was made from the net income, thereby reducing the taxable income for the excess profits tax to $38,000. This deduction is allowed according to Section 203 of the War Revenue Act, which is as follows:

"That for the purpose of this title the deduction shall be as follows: (a) in the case of a domestic corporation the sum of (1) an amount equal to the same percentage of the invested capital for the taxable year which the average amount of the annual net income during the pre-war period was of the invested capital for the pre-war period (but not less than seven or more than nine per centum of the invested capital for the taxable year) and (2) $3,000."

This means in effect that if a corporation earned nine per cent upon its invested capital during the three years previous to the war, then it will be allowed to deduct nine per cent. of the amount of invested capital from the net income for 1917 before computing the

excess profits tax, plus an additional specific deduction of $3,000, which is allowed in all cases.

Where the invested capital is large and the net income is small in proportion, the tax will also be less. Thus a corporation with a capital investment of $500,000, whose annual net income is only $50,000, would be allowed the deductions as shown below.

Net Income	$50,000	
Deducting 9% of capital, the maximum deduction	$45,000	
Additional specific deduction	3,000	48,000
Amount subject to 20% excess profits tax	$ 2,000	$ 400
Net Income	$50,000	
Less amount of the excess profits tax	400	
Net income subject to 6% income tax	$49,600	2,976
Total taxes		$3,376

Items 5, 6, 7, 8 and 9 in Schedule A are covered by Section 201 of the War Revenue Act, which requires that the excess profits tax be computed on the following basis:

5. "Twenty per centum of the amount of net income in excess of the deduction and not in excess of fifteen per centum of the invested capital for the taxable year;

15% of the invested capital	$15,000	
Less the deduction	12,000	
Amount subject to 20% excess profits tax	$ 3,000	—Tax $ 600

6. "Twenty-five per centum of the amount of net income in excess of fifteen per centum and not in excess of twenty per centum of such capital;

20% of the invested capital	$20,000	
Less 15% of the invested capital	15,000	
Amount subject to 25% excess profits tax	$ 5,000	—Tax $ 1,250

7. "Thirty-five per centum of the amount of net income in excess of twenty per centum and not in excess of twenty-five per centum of such capital;

25% of the invested capital	$25,000	
Less 20% of the invested capital	20,000	
Amount subject to 35% excess profits tax	$ 5,000	—Tax $ 1,750

8. "Forty-five per centum of the amount of net income in excess of twenty-five per centum and not in excess of thirty-three-per centum of such capital;

33% of the invested capital	$33,000	
Less 25% of the invested capital	25,000	
Amount subject to 45% excess profits tax	$ 8,000	—Tax $ 3,600

9. "Sixty per centum of the amount of net income in excess of thirty-three per centum of such capital."

Total net income	$50,000	
Less 33% of the invested capital	33,000	
Amount subject to 60% excess profits tax	$17,000	—Tax $10,200

The total amount of the excess profits tax as shown by Schedule A is $17,400. This amount may then be deducted from the net income before the income tax of 6% is computed. This leaves a net income of $32,600 on which the 6% tax is computed, making a total income tax of $1,956. Adding the income tax and excess profits tax together, the total taxes amount to $19,356.

TAX ON UNDISTRIBUTED EARNINGS

Section 1,206 (b) contains the provision that "there shall be levied, assessed, collected and paid annually an additional tax of ten per centum upon the amount of net income remaining undistributed six months after the end of each calendar or fiscal year, of the total net income of every corporation, joint-stock company or association, received during the year, but not including the amount of any income taxes paid by it within the year imposed by the authority of the United States."

This provision was no doubt inserted to discourage corporations from retaining in their hands large amounts of undivided profits which are not required in the direct operation of the business. This provision will also encourage the distribution of profits in the form of dividends to stockholders, at least during the period of the war.

But it is further provided that "the tax imposed by this subdivision shall not apply to that portion of such undistributed net income which is actually invested and employed in the business or is retained for employment in the reasonable requirements of the business or is invested in obligations of the United States issued after September 1, 1917."

It is easily apparent that if a corporation invests its undivided profits in United States government bonds issued after September 1, 1917, that the amount of undistributed profits so invested will be free of this tax; while if the amounts are invested in other classes of securities, then the tax will apply.

There is also a provision that if a corporation retains undistributed profits for employment in the business, and does not so employ these earnings, then they shall be subject to a tax of 15%. This provision is the form of a penalty for attempted evasion of the payment of the 10% tax.

All corporations will have ample time for the proper distribution of their earnings, as the law allows six months time from the close of the year for this purpose.

INDIVIDUAL ENGAGED IN BUSINESS

Assuming an individual to be engaged in business with an invested capital of $100,000, and an annual net income of $50,000.

The excess profits tax would be computed in the same manner as shown in Schedule A, with the exception that the specific deduction would be $6,000 instead of $3,000 as shown for a corporation. In this instance the tax on excess profits would be $16,800. The income tax will then be ascertained as shown below.

Net Income of individual	$50,000
Deduct the excess profits tax	16,800
Amount subject to income tax	$33,200

Income Tax on $33,200

$29,200	at 2	per cent	$ 584
31,200	" 2	" "	624
2,500	" 1	" "	25
2,500	" 2	" "	50
2,500	" 3	" "	75
2,500	" 4	" "	100
5,000	" 5	" "	250
13,200	" 8	" "	1,056

Total income tax	$ 2,764
Excess profits tax	16,800
Total taxes	$19,564

NICKEL AND BRASS PLATING OF DIE CASTINGS

An Article Giving Some Valuable Information for the Finishing of Soft Metal Articles.

By R. J. Hazucha, Chicago Branch, American Electro-Platers' Society.

Since the outbreak of war in Europe the plater has been in the limelight very much, on account of the scarcity of copper and its alloys, and the plating and finishing he now has to perform on die castings, steel and aluminum, which is an entirely new problem, and no doubt the die castings are the most perlexing and difficult of all, considering the quantity of die castings now being plated against aluminum castings. Steel having been plated for years, is not particularly new.

There has been some literature written on the subject of plating die castings, and it seems to me that every plater has his own way. If all the platers that are plating die castings could in some way get together into one plating plant, I am sure that they would all agree to plate their die castings the same way, and they would feel sure they are doing it the right way. But such a gathering is out of the question, so I am going to explain the way I handle and plate die castings, of which I plate from 15,000 to 25,000 pieces a day.

In my estimation, the principal factor in plating die castings is the cleaning. If the die castings are cleaned in a cleaner that will not attack the aluminum in the castings, or oxidize them, half the work is done.

Most die castings have some kind of knurl or lettering, and in the buffing operations these will fill up with buffing composition, which should be removed with gasoline or benzine, because you cannot leave die castings in any cleaner long enough to loosen the dirt so you could remove it after. After the castings are washed in gasoline or benzine and dried in hardwood sawdust they are wired up, or put on suitable racks and run through a cleaner from one-half to one minute, then rinsed in clean water and put in the nickel solution.

Castings that are racked should be kept away from the center rod of the rack at least two inches, and when two or more pieces are hung on a cross bar there should be at least two inches of space between them, because die castings are poor conductors of current, and this prevents them from being plated where they are hung close together.

For cleaning die castings I use a mild cleaner, five ounces to a gallon of water, and I get very good results because I do not have to keep it at a boiling point, and I can use the same cleaner for brass and steel. The writer will furnish the name of the cleaner to anyone upon request.

If the castings are to be nickel plated and have deep pockets they should be struck in a bright brass solution from five to ten minutes, because the castings are poor conductors of current and a coating of brass increases the conductivity so that they can be nickel plated successfully. After the castings are struck up in a bright brass solution they should be rinsed in clean water and put in a nickel bath from five to fifteen minutes. A ten-minute deposit will stand a hard coloring on an eight-inch buff. The cathode rod on the nickel tank should be in a motion, three-inch stroke, twenty times a minute, is recommended; because it is possible to use a much higher current when the castings are in motion.

For nickel plating die castings I use a saturated solution of ammonium nickel sulphate and water at room temperature; to every gallon of this solution I add three ounces of nickel sulphate, three ounces magnesium sulphate and two and one-half ounces of boracic acid and a large amount of anodes. The current I use for nickel plating is 22 amperes per square foot, with 3¼ volt pressure.

For brass plating die castings before nickel plating I use the following formulas.

Solution made up from metal carbonates—

Water	1	gallon
Copper Carbonate	1	ounce
Zinc Carbonate	1	ounce
Sodium Cyanide	3⅓	ounces
Sodium Bisulphide	2	ounces
Sodium Carbonate	3	ounces
Or Soda Ash	1⅛	ounces

This solution works very good with no free cyanide when new, but requires small additions of cyanide after couple weeks of washing.

Solution made up from metal cyanides—

Water	5	gallons
Sodium Cyanide	11	ounces
Copper Cyanide	6½	ounces
Zinc Cyanide	2	ounces
Sodium Bisulphide	2	ounces
Ammonium Carbonate	1⅓	ounces
Soda Ash	1⅓	ounces

In both of these solutions I use copper anodes.

The current I use for brass plating is twenty amperes per square foot with 5¼ volt pressure for five minutes, during which time the current drops to thirteen amperes, 5¼ volts per square foot; after five minutes I cut the current down to three amperes per square foot with 1½ volt pressure.

For a heavy deposit of brass I double the proportions to the same amount of water. After several batches of work have been run through the newly-made solution, I add ⅛ ounce of white arsenic dissolved in caustic soda to every 100 gallons of solutions; this keeps the deposit bright and uniform.

DISCUSSION.

Mr. Ter Doest: I would like to ask the author if he doesn't think that the reason that everybody plates die castings differently is that they are of different compositions. Are all your die castings made by one concern?

Mr. Hazucha: Yes, but the composition of the casting is not the same. Some castings require to be stronger than others, that changes the composition. The firm that make these die castings have about 28 formulas for making die castings. I follow the same routine on all of the die castings and it works out all right.—Monthly Review American Electro-Platers' Society, October, 1917.

AN ALUMINUM SOLDER.

The necessary quantities of ingredients for a good aluminum solder are as follows:

Tin	75.5	parts
Aluminum	2.5	parts
Zinc	18	parts

The best method of preparing this mixture is to first melt each ingredient in separate crucibles as they all melt at different temperatures. Then mix the zinc and tin and stir and finally pour in the aluminum and stir well.

No flux is necessary for this solder and the article to be soldered should be scraped clean. The solder should be melted so as to drop on the article. A blow torch flame must be directed on the part to be repaired during the soldering operation.—P. W. B.

COPPER ELECTROTYPING

Some Important Data Relating to the Preparation and Operation of Acid Copper Solutions.

Written for The Metal Industry by Samuel Wein.

We often see in the trade journals, formulas on electrotyping. These unfortunately are incomplete, and at times not accurate. This is probably due to the fact that the individual responsible for the formula was not sufficiently experienced, and in many cases the facts given were placed at random, although it can be proven that they were not even observed.

THICKNESS OF COPPER DEPOSITED FROM ACID SULPHATE SOLUTION

Current density used (amp./sq. ft.)	Thickness of Deposited Copper (inches) 1 hour	2 hours	3 hours	4 hours	5 hours	10 hours
1	0.00006	0.00011	0.00017	0.00023	0.00028	0.00057
5	.0003	.0006	.0008	.0011	.0014	.0028
10	.0006	.0011	.0017	.0023	.0028	.0056
15	.0008	.0017	.0025	.0034	.0042	.0085
20	.0011	.0023	.0034	.0045	.0056	.0113
25	.0014	.0028	.0042	.0056	.0071	.0141
30	.0017	.0034	.0051	.0068	.0085	.0169
35	.0020	.0040	.0059	.0079	.0099	.0198
40	.0023	.0045	.0068	.0090	.0113	.0226
45	.0025	.0051	.0076	.0102	.0127	.0254
50	.0028	.0056	.0085	.0113	.0141	.0282
55	.0031	.0062	.0093	.0124	.0155	.0311
60	.0034	.0068	.0102	.0136	.0169	.0339
65	.0037	.0073	.0110	.0147	.0184	.0367
70	.0040	.0079	.0119	.0158	.0198	.0395
75	.0042	.0085	.0127	.0169	.0212	.0424
80	.0045	.0090	.0136	.0181	.0226	.0452
85	.0048	.0096	.0144	.0192	.0240	.0480
90	.0051	.0102	.0152	.0203	.0254	.0508
95	.0054	.0107	.0161	.0215	.0268	.0536
100	.0056	.0113	.0169	.0226	.0282	.0565

FIG. 1—TABLE OF THICKNESS OF DEPOSITED COPPER.

The writer has had much experience in electrotyping with copper on wax, gutta-percha and similar compounds, this work being mainly confined for making what is known as "matrices." The facts about to be given are the result of many months of research and investigations, the formula of the electrolyte is being used extensively in several plants.

WEIGHT OF COPPER DEPOSITED FROM ACID SULPHATE SOLUTION

Current density used (amp./sq. ft.)	Weight of 1 square foot of deposit (ounces) 1 hour	2 hours	3 hours	4 hours	5 hours	10 hours
1	0.04	0.08	0.13	0.17	0.21	0.42
5	.21	.42	.63	.84	1.05	2.09
10	.42	.84	1.26	1.67	2.09	4.18
15	.63	1.26	1.88	2.51	3.14	6.28
20	.84	1.67	2.51	3.35	4.18	8.37
25	1.05	2.09	3.14	4.18	5.23	10.46
30	1.26	2.51	3.77	5.02	6.28	12.55
35	1.46	2.93	4.39	5.86	7.32	14.64
40	1.67	3.35	5.02	6.69	8.37	16.73
45	1.88	3.77	5.65	7.53	9.41	18.83
50	2.09	4.18	6.28	8.37	10.46	20.92
55	2.30	4.60	6.90	9.20	11.50	23.01
60	2.51	5.02	7.53	10.04	12.55	25.10
65	2.76	5.44	8.16	10.88	13.60	27.19
70	2.93	5.86	8.79	11.71	14.64	29.28
75	3.14	6.28	9.41	12.55	15.69	31.38
80	3.35	6.69	10.04	13.39	16.73	33.47
85	3.56	7.11	10.67	14.22	17.78	35.56
90	3.77	7.53	11.30	15.06	18.83	37.65
95	3.97	7.95	11.92	15.90	19.87	39.74
100	4.18	8.37	12.55	16.73	20.92	41.84

FIG. 2—TABLE OF WEIGHT OF DEPOSITED COPPER.

While the work was mainly for phonographic matrices, it might however be said that it can be used for any other electrotyping purpose.

An electrotype consists of a wax or similar compound in which an impression has been made. This is then coated with the finest form of graphite, using a fine, soft badger's or camel's hair brush. Care must be exercised not to scratch the surface of the impression. Proper electrical connections are made to this, and it being placed in an acid copper sulphate solution, which consists of the following ingredients:

Sulphuric acid...........	7 to 11 ounces
Copper sulphate.........	27 to 34 "
Water..................	1 gallon

The density of this electrolyte at 77 to 86 deg. F. should be 21 to 22 deg. Bé. (Specific gravity, 1.17 to 1.18.)

The best results are had with a current density of between 40 to 90 amperes per square foot.

TIME REQUIRED FOR COPPER DEPOSITION FROM ACID SULPHATE SOLUTIONS

Time required to produce deposit of specified thickness (inches)

Current density used (amp./sq. ft.)	0.001 Hrs.	0.001 Mins.	0.002 Hrs.	0.002 Mins.	0.003 Hrs.	0.003 Mins.	0.004 Hrs.	0.004 Mins.	0.005 Hrs.	0.005 Mins.	0.006 Hrs.	0.006 Mins.	0.007 Hrs.	0.007 Mins.	0.008 Hrs.	0.008 Mins.	0.009 Hrs.	0.009 Mins.	0.010 Hrs.	0.010 Mins.
1	17	43	35	25	53	8	70	50	88	33	106	16	123	58	141	41	159	23	177	6
5	3	32	7	5	10	38	14	10	17	43	21	15	24	48	28	20	31	53	35	25
10	1	46	3	32	5	19	7	5	8	51	10	38	12	24	14	10	15	56	17	43
15	1	11	2	22	3	32	4	43	5	54	7	5	8	16	9	26	10	37	11	48
20		53	1	46	2	39	3	32	4	26	5	19	6	12	7	5	7	58	8	52
25		42	1	25	2	7	2	50	3	32	4	15	4	57	5	40	6	22	7	5
30		35	1	11	1	46	2	22	2	57	3	32	3	8	4	43	4	19	5	54
35		30	1	1	1	31	2	1	2	32	3	2	3	32	4	3	4	33	5	4
40		27		53	1	20	1	46	2	14	2	39	3	6	3	32	3	59	4	26
45		24		47	1	11	1	35	1	58	2	22	2	46	3	9	3	32	3	56
50		21		42	1	4	1	25	1	46	2	7	2	29	2	50	3	11	3	32
55		19		39		58	1	17	1	37	1	56	2	15	2	35	2	54	3	13
60		18		35		53	1	11	1	29	1	46	2	4	2	22	2	39	2	57
65		16		33		49	1	5	1	22	1	38	1	54	2	11	2	27	2	43
70		15		30		46	1	1	1	16	1	31	1	46	2	1	2	17	2	32
75		14		28		42		57	1	11	1	25	1	39	1	53	2	8	2	22
80		13		27		40		53	1	6	1	20	1	33	1	46	2	0	2	13
85		12		25		38		50	1	2	1	15	1	27	1	40	1	52	2	5
90		12		24		36		47		59	1	11	1	23	1	35	1	46	1	58
95		11		22		34		45		56	1	7	1	18	1	29	1	41	1	52
100		11		21		32		42		53	1	4	1	14	1	25	1	36	1	46

FIG. 3—TABLE OF TIME FOR COPPER SOLUTIONS.

It is advisable to thoroughly agitate the electrolyte in order to facilitate a good deposition.

The wax impression with the film of graphite is allowed to remain in the electrolyte as long as desired until the thickness of the "copper shell" has already been reached, for duration of time reference should be had to the table. Fig. 3.

In order to remove the shell from the wax, it is slightly heated either by a flame or in hot water. The side of the shell which was next to the war surface will be found to have a very fine finish.

It is interesting to note that an increase in the amount of copper sulphate or the sulphuric acid will slightly increase the tensile strength of the shell. By increasing the temperature above the normal the tensile strength will decrease.

If the instructions are closely followed, the shell will have a tensile strength of between 35,000 to 40,000 pounds per square inch, with an elongation of 20 to 30 per cent.

In concluding, the writer wishes to acknowledge the assistance of Mr. D. Fromberg in all experiments.

EDITORIAL

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CONTENTS

COAL CONSERVATION

In these days of shortage of fuel, ways and means of conserving what we have prove of interest. The article appearing on the first page of this issue of THE METAL INDUSTRY gives some valuable data as to how considerable saving may be effected. Although the matter of condition and repair of coal consuming furnaces has of course received careful consideration in most concerns, there are unfortunately a surprising number of plants that neglect it altogether. Some foundries are apt, in the rush of everyday business, to overlook the small details until their attention is called to them by outside conditions. It is to them that Mr. MODROW's article will appeal with the most force. If all coal users will see to it that all of their apparatus is carefully kept in the best possible condition and then only the minimum amount of fuel is used to produce the desired result, we are sure the amount of saving will be surprisingly large. THE METAL INDUSTRY would be glad to hear from any one interested in the use of fuel who has any suggestions to offer for the conservation of fuel of all kinds.

NICKEL SILVER

In March, 1917, THE METAL INDUSTRY published an editorial on the subject of METAL NOMENCLATURE. The editorial urged the continuation of the consideration once started of the subject. It also suggested that it be taken up at the 1917 convention of the American Institute of Metals held at Boston in September. Nothing was done at that convention. We now suggest that some official attention be given the matter by the American Society for Testing Materials at the meeting in July at Atlantic City.

The matter has taken on added importance in view of the fact that the largest brass producing company of the United States has lately changed the name of the alloy known as "German Silver" to "Nickel Silver." It seems to us that if a change in name of this material is to be made that we should not stop half way. Why retain the word silver? Why attempt to ennoble a combination of base metals? Surely there can be no other reason than a commercial one. As we said in our March, 1917, editorial, if the nickel is taken from an 18 per cent "German Silver" alloy only a "two and one" brass will remain. Why not then call the compound "NICKEL BRASS," or if commercial objections are too strong to be overcome at once why not call it NICKEL ALLOY? The various contents of nickel may be designated by utilizing the different percentages that the alloy contains. Thus FOUR, SIX, EIGHT, TEN, TWELVE, FIFTEEN, EIGHTEEN, etc., PER CENT NICKEL ALLOY. It is a fact that some manufacturers are already designating the material now being sold as "Sheffield plate" as SILVER PLATE on a NICKEL BASE.

We see no reason why the same argument does not apply to the alloy now being called "NICKEL SILVER." As a matter of fact the "new" name is no more correct than the one it supplants for the alloy contains no silver and while it is admitted to possess some similar physical characteristics it has really no claim to nobility!

THIRD LIBERTY LOAN

THRIFT, THE KEYNOTE.

Nearly everyone will remember the ancient fable of King Midas to whom it was vouchsafed that whatever he touched should turn to gold. Whereupon the venerable and greedy monarch approached the brink of the grave from starvation and was only saved at the last moment when the gods withdrew his magic gift.

But a great many people still believe that gold, or money, can feed and clothe armies and navies, though King Midas couldn't live by it; can produce ships and shells and guns by some process of alchemy which they don't pretend to explain.

The fact is, of course, that money (and the same holds true of bonds, even Liberty bonds) produces no more than do poker chips or brass checks or any other convenient tally. It is equally as edible; it kindles no better fire; it can be shot from French 75s with about the same effect. Civilization has simply confused our minds with its complications. But if we go back to first principles the case becomes clear. No one ever accused the Indians of making war with wampum.

The things which are productive, which do count, whether in the support of King Midas or Uncle Sam, are goods and services, things to eat and wear and shoot and the human labor which produces and consumes them. Only, this labor must produce more than it consumes, since it is on this surplus alone that the army and navy and all related services, whether at home or in France, subsist and function. Every loaf of bread and bag of coal which our present economy provides is grist to their mills; every servant we can give up who might be employed in a munition plant or on the farm—and this applies to bootblacks and delivery boys and the many others who pander to the laziness of all of us, as well as to butlers and ladies' maids and chauffeurs; and every minute of our own labor which we could make more productive strengthens the nation's fighting machine.

"The gospel of goods and services is the gospel which, in season and out of season, the National War Savings Committee has been preaching throughout Great Britain for the last eighteen months. The war can be paid for only out of savings."

These are the words of Basil P. Blackett, of the British Treasury, in an address before American bankers last September.

It is the duty of every man, woman and child in the United States to produce more and consume less, and then to pass over to Uncle Sam through the purchase of Liberty bonds the savings which he has effected in this two-fold manner. The next sale of Liberty bonds can be of no value to the Government unless those savings of goods and labor are now being made for which the money which the Government borrows can be exchanged.

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

MARKET PRICES OF METALS

It was recently stated by a high official of a well known brass company that the announcement of market metal prices is conducive of more harm to the metal manufacturers than of good. When asked to explain the meaning of this statement the official in question replied as follows:—ED.

"It is a well-known fact that even though metal prices may be given out by producing and selling companies as the prices that are known as 'market,' they are never, or hardly ever, adhered to in actual business relations. For instance, a customer may be in the habit of purchasing large quantities of materials from a particular mill, and one day he may wish to include in his order some small lots of metal of either a special composition or of a special shape. The mill wishing to accommodate a regular customer executes the small order along with the larger one, but when the invoice is presented the customer finds that he has been charged, what is to him, an outrageous price.

"Asking the mill for an explanation of the different or apparent increase in price over what he had expected to pay, he is told that it involves considerable expense in order to get out the small order, as compared with the filling of any order calling for a large amount of regular standard material. The customer is still not convinced, for as, he vehemently declares, the market price of just such a mixture as his small order was composed of was given out at such and such a time, and he proceeds to produce a proof of his statement and he tries to force a reduction in prices by the manufacturer.

"The above is only one instance of the trouble that such announcements of market prices can cause the manufacturing mill.

"Another phase of the situation is shown in the fact that buyers of large corporations are prone to use prices as levers to force down the price of producers. "In my opinion," says this official, "the buyers of corporations or department stores are big enough liars now without being given any further aid by means of market prices. A buyer will call us up on the telephone and inquire the price of such and such material, we will quote him our best price. He emits a sort of a Machiavellian cackle and joyfully informs us that he has on his desk several quotations that are considerably below our figures, and if we will send our salesman to him he will gladly exhibit the evidence. In due time our salesman arrives at his office and is informed that something has happened to the quotations and they are not to be found, but he is perfectly sure that what he had stated were the facts.

"Then follows an attempt on the part of Mr. Buyer to force us to reduce our prices. Finding this to be impossible, the prospective negotiation is declared off. After a lapse of two or three days we are called on the phone by this same buyer and he then, with a great deal of cordiality, proceeds to place with us the order for the material in question and at our own prices.

"In all of our long years in the brass business we have never known but one single fixed price in regard to metals that has been adhered to to any extent, and this price is that of copper, which was fixed last Fall by the United States Government at 23½ cents per pound. It might be stated in passing that the fixation by the Government of the copper and coal prices appears to me to be a direct violation of the Sherman law, and it is my belief that it will be found necessary for other prices to be fixed and ultimately the law will have to be repealed. I should like to hear from other manufacturers their ideas as to the issuing of market prices."

January 31, 1918. MANUFACTURER.

[THE METAL INDUSTRY would be glad to hear from both manufacturers and buyers as to what their experience has been with market prices of metals.—Ed.]

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

CASTING

Q.—In casting large covers which are about 30 inches diameter, 1¼ inches thick (flat on one side with a ring 2 inches square and two rings about 5 inches diameter on the other side), the castings come with holes, the metal tends to separate and the castings will not stand an air pressure without showing leaks. The mixture used is 88 copper, 10 lead and 2 tin and 1 per cent. of 15 per cent. phosphor copper. The lead sweat out and this was taken care of by using sulphur, but the sulphur caused the castings to leak more although it held the lead. The castings were tried with either side up and molds well dried. The best results were obtained with four heavy risers on the top of the ring, these risers being well churned.

The first casting made (although it lost some of the lead) was the best one and it was made off hand, without any special care. After the first one it has been impossible to get a good one.

A.—It is quite difficult to obtain an alloy high in lead like the one mentioned, free from oxides and dross. Unless this is done, castings made from such an alloy will necessarily leak, if an open flame furnace is used for melting, the alloy can be kept covered with a flux of lime three parts and fluor spar one part, which will serve to prevent oxidation and dross. Some dross may form during the operation of pouring, but this can be kept from entering the mold by bottom pouring using finger gates.

The separating or sweating of the lead is often due to poor melting and alloying. If the copper is not hot enough the lead will not alloy well and hence it will separate. This will be true also if the lead is added all at once. It should be added to the mixture a little at a time and well stirred in.—J. L. J. Problem 2,534.

Q.—We have to supply copper alloy castings, having a special mixture of copper, tin and lead. The lead, being 28 per cent., is excessive, and we are having segregation trouble. Our method of melting is to run down the copper first, and then add to the tin and lead, stirring well before pouring into each box, and we are cooling the castings as rapidly as possible. Do you know of a flux, or can you give us any advice to prevent this segregation taking place?

A.—The alloy mentioned is notoriously difficult to cast free from segregation. The addition of 1 per cent. nickel in the form of cupro-nickel (50-50) will have a beneficial influence by retarding segregation. The more rapid the rate of cooling the better, and chill molds or chills should be used if possible. The addition of a little sulphur in the form of pure lead sulphide or copper sulphide is also said to retard segregation. Not more than 0.1 per cent. sulphur, however, should be used. Add the cupro-nickel to the molten copper, stir well in, then add the sulphide if necessary, and finally the lead and tin. The alloy should be stirred very thoroughly, immediately before pouring.—W. T. F. Problem 2,535.

COLORING

Q.—We desire to produce a reddish color on yellow brass castings and we believe there is a method of obtaining this color in the mold or as they come from the molds. We believe also there is a method of doing this by mixing something with the metal.

Can you give us some information along these lines?

A.—The reddish color to which you refer is merely a surface discoloration or oxidation. It can be obtained in most cases by leaving the castings in the sand until cold. The sand keeps the castings hot a long time and thus gives the surface an opportunity to oxidize.

The addition of ½ pound of 30 per cent. manganese copper to each 100 pounds of the alloy will promote the formation of the reddish color and also act as a deoxidizer. If too much manganese copper is added it is liable to make dirty castings, as the manganese will oxidize and more or less of the manganese oxide remains entangled in the molten metal. Commercial manganese copper is made from ferro-manganese and hence always contains some iron. This is another reason for using it sparingly as if an excess of iron is present in a casting it will oxidize and produce black, dirty castings.—J. L. J. Problem 2,536.

DIPPING

Q.—We would like to have you recommend a dip which will enable us to produce a gun metal finish on yellow brass buckles.

A.—There are several dip solutions that may be satisfactorily used for producing a gun metal finish upon yellow brass buckles. These solutions consist of the following materials:

No. 1.

Aqua ammonia 26 per cent.	1 gallon
Copper carbonate	1 pound
Water	1 quart
Carbonate of soda	8 ounces

Mix the materials in the order given and use the solution at a temperature of 160 degrees Fahr.

No. 2.

Water	1 gallon
Sodium cyanide	8 ounces
Caustic soda	4 ounces
White arsenic	6 ounces

Prepare the solution by first dissolving the cyanide in two-thirds of the hot water, then dissolve the caustic soda in the remaining one-third of water, add the white arsenic and when dissolved mix with the cyanide solution. Use the solution at the boiling point.

No. 3.

Water	1 gallon
Hyposulphite of soda	8 ounces
Acetate of lead	2 ounces

Mix in the order given and use at 180 to 212 degrees Fahr. The articles must be cleansed and bright acid dipped before immersing in any of the above solutions.—C. H. P. Problem 2,537.

FINISHING

Q.—How can we produce a rubber finish on steel buckles similar to a hard rubber finish?

A.—The method for producing a finish similar to a rubber finish would be to coat them with some cheap oil high in carbon and revolve them in an air tight steel drum in a furnace which should be heated to 800 to 1,000 degrees Fahr. The method used is similar to that used in roasting coffee or bluing and tinning tacks by the acid of heat.

Another similar method that is being used to produce a carbon black upon large headed steel nails for automobile upholstery is to use pine sawdust instead of oil. The sawdust is first heated in the drum until charred like fine charcoal, then the smoke is allowed to pass off and the buckles are immediately placed in the drum in the charcoal sawdust and revolved in the furnace until a good carbon black is obtained. The time required would be about thirty minutes and a large quantity of buckles could be finished at one time at a low cost. It is necessary, of course, to have the buckles clean and bright before carbonizing.—C. H. P. Problem 2,538.

FLUXING

Q.—In using babbitt metal we have considerable skimmings and dross which causes considerable loss. Will you kindly advise me what flux and method we can use to recover part of this?

A.—Where gas is used for melting, the installation of a Meker burner will prove a source of much economy in fuel and besides with them the temperature cannot be forced unduly. Hence, the amount of skimmings and dross should not be excessive as is the case when the babbitt is overheated.

Attempts to use a flux on babbitt pots do not, as a rule, prove satisfactory. When the babbitting room is small or the ceiling low, sal ammoniac or rosin fluxes make so much smoke that they cannot be used.

On a large scale, skimmings and drosses are recovered by sweating out the unoxidized metal in a regular sweating furnace. The remaining material, which is chiefly oxides, may be reduced to metal by mixing with hard coal and a suitable flux and heating to a high temperature in a reverberatory furnace. You can, however, recover considerable metal by simply heating the dross in an iron pot, treating with sal ammoniac and squeezing out the liquid metal with the aid of an iron paddle. An inclined iron pan may be used instead of the iron pot.—J. L. J. Problem 2,539.

METALLIZING

Q.—We would like to have you give us the formula for plating baby shoes in gold, silver and bronze finishes.

A.—The method to be followed in metallizing baby shoes would be the same as with any other non-metallic surface, such as plaster, wood, etc.

First, coat the shoes with two or three thin coats of orange shellac varnish, cut in denatured alcohol. Second, when the shellac varnish is thoroughly dry a coating of platers' copper bronze powder mixed with a bronze medium, such as gun cotton lacquer should be applied uniformly by the usual lacquer spraying method. One or two coats should be applied.

Third, when the coating of copper bronze powder is thoroughly dry the shoes are copper plated in an acid copper solution consisting of the following materials:

Water	1	gallon
Copper sulphate	1¾	pounds
Sulphuric acid	4	ounces
Powdered alum	1	ounce

The temperature used should be normal and voltage 1 volt.

After the shoes have been plated from two to five hours they may be polished or further plated in the regular silver or gold solutions or in any antique finishes desired.—C. H. P. Problem 2,540.

OILING

Q.—Will you give me particulars for the oiling of black nickeled parts, instead of lacquering same?

A.—Black nickel-plated parts may be oiled instead of lacquered, either by immersing in hot linseed oil or paraffin, oil heated to the boiling point of water. To every gallon of oil dissolve four ounces of paraffin wax. Other oils, such as cocoanut oil, may be used, but the linseed or paraffin oils give the best results.—C. H. P. Problem 2,541.

PEELING

Q.—We harden the steel "rocker arms" of a gas engine timer by an oil process. The arms, like other portions of the engine, are first copper and then nickel plated. The engine is then given a test of a twenty-four hour run which causes the plate on the rocker-arm to peel. This is the only portion of the engine which causes any trouble with peeling. Can you give the cause and a remedy for this condition?

A.—To overcome the trouble of peeling of the deposit upon the hardened steel rocker arm, we would suggest that after thoroughly cleansing with the usual alkaline solutions you immerse the casting in a solution of 1 gallon of water and 2 quarts of hydrofluoric acid for a moment or two, then rewash in water and plate as usual. The only reason we can give for this trouble is the lack of a chemically clean surface.—C. H. P. Problem 2,542.

PLATING

Q.—We are having trouble with our zinc solution, which is made up of zinc sulphate, zinc chloride, a small amount of salt and a small amount of boracic acid. We were using this in a pitch lined wood tank and obtained excellent results using six volts. Our tank began to leak, however, so we purchased a steel tank. For the first week the solution acted as usual, then the deposit began to come out very dark. We found that the solution had dropped down from the specific gravity of 16 degrees Baume, the usual reading, to about 10 degrees. We added zinc sulphate to make the reading 16, and for a day and a half obtained a nice white plate, then the plate began to come out dark again, and we cannot determine why it does and what to do to overcome it.

We have experimented in a large jar with all kinds of additions, but have come to no satisfactory conclusion, and would appreciate it very much if you could tell us what the trouble is and how to remedy it.

A.—No doubt the difficulty experienced with the zinc sulphate solution in the steel tank is due to polarization. A counter current is set up between the zinc anodes which are positive and the steel tank which becomes negative to the zinc. Therefore, the solution is constantly robbed of its metal because a reducing action does not occur at the anode owing to the counter current set up.

Steel tanks should never be used for acid solutions unless they are protected with a non-conductive surface, such as asphaltum used in lining wooden tanks. We would suggest that you line the sides of the tank with ½-inch wood; that is, on the anode sides. The wood being a non-conductor will no doubt prevent polarization. If it does not, you will have to remove the entire solution and insulate with the asphaltum or use a wooden tank, but we would suggest that you try the wooden lining first.—C. H. P. Problem 2,543.

TEMPERING

Q.—We have adopted the method of tempering our fluted and spiral reamers in a lead bath and have found it to be the best method compared to using a furnace or tempering solution, as it prevents the tools from becoming strained or having water cracks due to being heated to so high a temperature. We experience great trouble with the lead sticking to the flutes in spots or projections of the tools and developing soft spots.

A.—To prevent hot lead from sticking to parts heated in a lead bath, mix common whiting with wood alcohol and paint the part that is to be heated. Water can be used instead of alcohol, but in that case the mixture must be thoroughly dry before heating, otherwise the moisture will cause the lead to fly. Another method is to make a thick paste according to the following formula:

Pulverized charred leather	1	pound
Fine wheat flour	1½	pounds
Fine table salt	2	pounds

Coat the tool with this paste and heat slowly until dry, then proceed to harden.

Still another method is to heat the work to a blue color or about 500 degrees Fahr., and then dip in a strong solution of salt water prior to heating in the lead bath.

The lead can sometimes be removed from parts having sharp or fine projections by using a stiff brush before immersing in the cooling bath. This is necessary to prevent soft spots.—P. W. B. Problem 2,544.

TESTING

Q.—It is possible, in your opinion, for a coppered steel article to withstand the following weathering test?

Immerse in a 5 per cent. solution of sodium chloride (common salt) for a period of fifteen hours and then expose to the atmosphere for eight hours without rinsing in fresh water. This operation to be repeated three times without any signs of rust or corrosion developing on the object.

We have been successful in making the coppered steel stand the first operation, but up to this writing not the second or third.

A.—We have never heard of this test being applied to copper plated steel as a rust test. It is, however, a common method used for testing zinc plated steel and is used by several of the large commercial electrical companies.

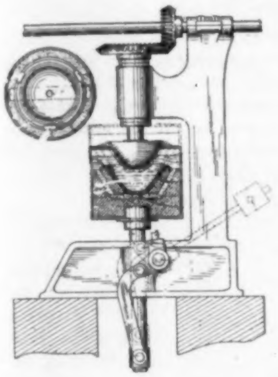
You would have to put an unusually heavy coating of copper upon the steel to stand the test. By first coating the steel with nickel and then copper plating you may be able to get results.—C. H. P. Problem 2,545.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,246,996. November 20, 1917. **Buffing and Polishing Machine.** Leo L. Pfeifer, of Columbus, Ohio, assignor to the Jno. W. Brown Manufacturing Company, of Columbus, Ohio, a corporation of Ohio.

This invention relates to buffing or polishing machines and is designed particularly for use in polishing the reflecting surfaces of searchlights or headlights.



The invention contemplates the combination of a die and plunger capable of relative movement to be brought together, as shown in cut, in a receptacle containing the proper polishing liquid and then causing a relative rotation between the die and plunger, it being, of course, understood that the reflector is in its operative position between the two.

Another object of the present invention resides in so arranging the structure to permit a circulation of the polishing liquid about the plunger to constantly supply the necessary polishing ingredients. In this manner the reflector is polished as well as more properly shaped.

1,247,977. November 27, 1917. **Aluminum Alloy.** William A. McAdams, Bay Shore, New York.

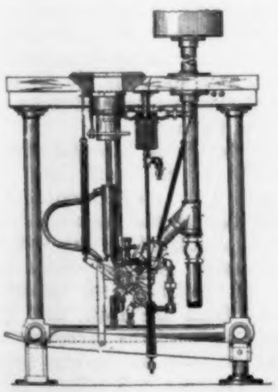
This invention relates to an aluminum alloy, with the object in view of providing a superior alloy suitable for casting purposes, which will not tarnish and which will possess the qualities of great fluidity and strength.

The invention consists in an alloy composed of aluminum, copper, zinc, antimony, and silver, in which, by weight, the amount of antimony exceeds the amount of silver, the amount of zinc exceeds the amount of antimony, the amount of copper exceeds the amount of zinc, and the amount of aluminum exceeds the amount of copper.

The aforesaid elements are preferably combined in the proportions of one hundred parts by weight of aluminum, seventeen parts by weight of copper, five parts by weight of zinc, one and one-half parts by weight of antimony, and one part by weight of silver.

1,249,725. December 11, 1917. **Mechanism for Applying Coating to Shells and Other Articles.** Herbert W. Day, of Wollaston, Mass., assignor to Spray Engineering Company, of Boston, Mass., a corporation of Massachusetts.

This invention relates to mechanism for applying paint or other coating material to shrapnel or other ammunition shells, and also to other articles, and in certain aspects thereof is an improvement upon the invention disclosed in Patent No. 1,201,219, dated October 10, 1916.



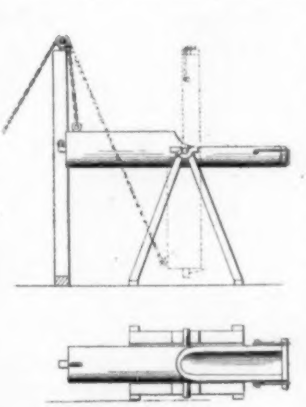
The patent covers the following claims: Mechanism, as shown in cut, for applying coating comprising an article support, a spray discharge member, means for effecting relative to and fro movement of said discharge member and said support during discharge from said spray discharge member, a container for a predetermined quantity of liquid coating and movable from a filling position to a discharging position, and fluid pressure means for ejecting the coating material from said container through said discharge means onto said article.

Means for applying liquid coating to hollow articles comprising a support for a hollow article, a nozzle adjacent to the opening thereof, means to impart relative to and fro movement to said article and said nozzle during discharge from said nozzle, a valve in connection with said nozzle constructed and arranged to receive a predetermined charge of coating, and fluid pressure means in communication with said nozzle.

1,250,212. December 18, 1917. **Copper Billet Mold.** E. T. Nye, Jr., Dollar Bay, Mich.

The invention relates to improvements in copper billet molds.

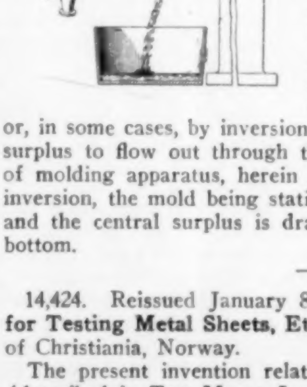
The object of the present invention is to improve the construction of copper billet molds and to provide a simple, practical and efficient mold, as shown in cut, designed for molding copper bars or billets and capable of enabling the same to be molded of a considerable length without liability of the copper splashing in the bottom of the mold and against the sides thereof and producing what is known as a cold set piece of copper which cannot be used in the manufacture of copper requiring the rolling or drawing of the metal.



A further object of the invention is to provide a copper billet mold of this character adapted to permit the molten copper to be poured into the mold while the same is in a horizontal position and without splashing and capable of being brought gradually into an upright position.

1,250,803. December 18, 1917. **Casting or Molding Device.** Edward G. Cook, of Long Island City, New York, assignor, by Mesne Assignments, to the Copper Products Company, a corporation of Maine.

This invention relates to molding devices, as shown in cut, for use in the forming from fluid metal of hollow articles of any form without the use of cores, and practically applies to the art of slough-molding, wherein the mold is first completely filled, and when the chilling effect of the mold has solidified the outer surface sufficiently to form a "chill" or shell while the center is still filled with the fluid metal, this surplus still fluid central portion of the metal is allowed to flow out, and this has been heretofore only brought about either by inserting a trochar through the mold and the "chill," into the still fluid central portion of the article being formed, and allowing the surplus metal to flow out through the puncture so made; or, in some cases, by inversion of the mold so as to permit such surplus to flow out through the sprue. In the improved form of molding apparatus, herein shown, there is no trocharing or inversion, the mold being stationary, and the fluid metal enters, and the central surplus is drained off, through a sprue at the bottom.



14,424. Reissued January 8, 1918. **Process and Apparatus for Testing Metal Sheets, Etc.** Abraham Marthinius Erichsen, of Christiania, Norway.

The present invention relates to a process and an apparatus (described in THE METAL INDUSTRY, November, 1916) for test-

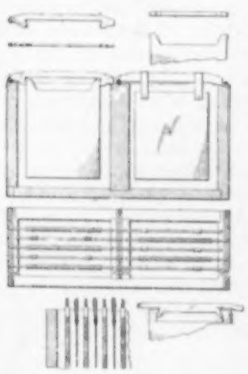
ing the resistance to compressive and tensile strains of metal sheets and plates.

According to the improved process the metal sheet undergoes the strains to which it becomes submitted in the practice when compressed, extended or stamped, the results of the test depending upon the stress of ultimate tenacity, as well as upon the resistance of the material.

The process consists essentially in that, contrarily to the usual tests performed, the metal sheet to be tested is engaged between a matrix and a holder, a constant free space or play of slight extent being left around said sheet, in order not to impede the free manifestation of the natural properties of the metal, but at the same time avoid formation of folds or plaits, and is freely pressed by the die in such a manner that the extending of the metal is gradually performed until the stress of ultimate tenacity is attained. The phases of the test may readily be watched and the resulting numbers may be read directly on the apparatus.

1,250,757. December 18, 1917. **Electrode Used in the Electrotype Process of Refining Metals.** T. L. Autisell, Perth Amboy, N. J.

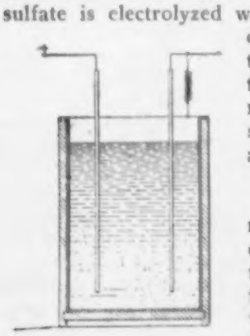
This invention relates to improvements in anodes and cathodes used in the multiple system in the electrolytic process of refining copper and other metals, as shown in cut, where an impure anode is suspended in an electrolyte and parallel to a thin sheet of copper or other metal — a cathode — and electricity from a proper source is conducted to and through the anode and from the anode through the electrolyte to the cathode, thereby dissolving the anode and depositing the metal on the said thin sheet of metal forming the cathode. Heretofore the custom has been to cast the anode with a projection, horn or lug at each upper end or corner for the double purpose of suspending the anode and electrifying the same, or to suspend the anode from a rod with hooks or links for the same purpose.



The patent covers a rod or bar for suspending an electrode in an electrolyte, said bar having a notch or recess on the under side at one end thereof, and also having on the lower side inwardly facing projections, the lower ends of which converge, a conductor on which said recess in the bar is adapted to rest, and an electrode having each upper edge outwardly inclined, said inclined portions being provided with recesses to receive said projections.

1,252,654. January 8, 1918. **Electrodeposition of Metals.** Anson G. Betts, Asheville, North Carolina.

This invention relates to the electrolytic recovery of metals from solutions of salts thereof, particularly zinc from acid sulfate solutions. In the electrolytic method of zinc recovery the zinc sulfate is electrolyzed with suitable anodes and cathodes, with deposit of metallic zinc on the cathodes, thus liberating sulfuric acid and making the electrolyte more acid until it is finally removed from the electrolytic cell as a solution of sulfuric acid containing only a little zinc sulfate.



The patent covers:

1. The method of electrodepositing metals of greater solubility in the acid of the salt contained in the electrolyte than lead, comprising the step of electrolyzing a solution of a salt of the metal with suitable anode and cathode in a vessel, as shown in cut, having an inner surface of lead, while passing current tothe lead inner surface.

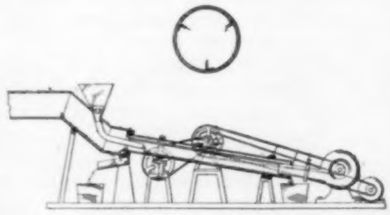
2. The method of electrodepositing metals of greater solubility in the acid of the salt contained in the electrolyte than lead comprising the step of electrolyzing a solution of a salt of the metal with suitable anode and cathode in a vessel having an inner surface of lead, while passing current from the anode to the said lead inner surface of the vessel.

1,252,887. January 8, 1918. **Process of Making Alloys.** H. L. Doherty, New York, N. Y.

This invention relates to processes of making alloys; and it comprises a method of making alloys of readily volatilizable metals, such as mercury, sodium, zinc, etc., with less fusible and less volatile metals wherein the metals of the two classes are combined together under pressure, as by heating them together in a closed casing adapted to withstand pressure at a temperature at which the less fusible metal melts, such casing being one adapted to withstand the pressure of the vapors of the more volatile metal at this temperature, and the alloy is then solidified.

1,253,539. January 15, 1918. **Apparatus of Reclaiming Metals from Waste.** E. E. Seacrist, Meadville, Pa.

This invention relates to apparatus for reclaiming metals from waste and has for its object the provision of means whereby copper, brass or other metals may be reclaimed from the slag, ladle skimmings, floor waste, etc., of bronze mills, brass foundries and the like.

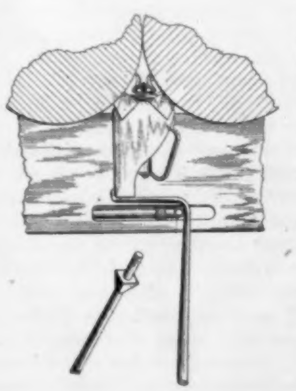


It is well known that in metal mills and foundries a considerable quantity of valuable metal is present and usually thrown away in the slag, ladle skimmings and floor accumulations. The importance of this waste was realized some time ago and as a consequence various methods and apparatus have been devised for the reclamation of such metal. The present practice is to granulate the slag, etc., wash it with a stream of water to remove the sand and other debris and then dry the metallic residue as a preliminary step to returning it is to the melting furnace. These various operations consume considerable time and require the services of several men with a consequent too great item of expense.

It is with these facts in view that the present invention, as shown in cut, has been designed which contemplates the provision of means whereby the waste, after being granulated, is subjected to a winnowing action to remove the useless fragments and particules and leave the particles of metal in a dry state ready for remelting, the operation requiring the attention of only one operator and being continuous in its action.

1,253,697. January 15, 1918. **Polisher.** W. W. Leach, Mansfield, Ohio.

This invention relates to an improvement in polishers, as shown in cut, primarily for use in cleaning and polishing the periphery of rollers used for rolling sheet metal in rolling mills and catch the refuse and broken parts of the carborundum blocks.



The general type of polisher used for the purpose noted comprises a block or holder in which is removably clamped carborundum blocks or sections, the device as an entirety being brought into contact with the rolls for the purpose of cleaning and polishing the surfaces thereof.

The device is movable longitudinally of the rolls and the pressure of the carborundum blocks against the surface of the rolls is regulated at the will of the operator. In the use of this type of polisher, the material cleaned from the rolls, and frequently parts of the carborundum blocks shipped or broken therefrom under unusual pressure by the operator, will adhere to or pass between the rolls, and result in a pitting or marring of the roll surface, with a resultant defect in the rolled sheets.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

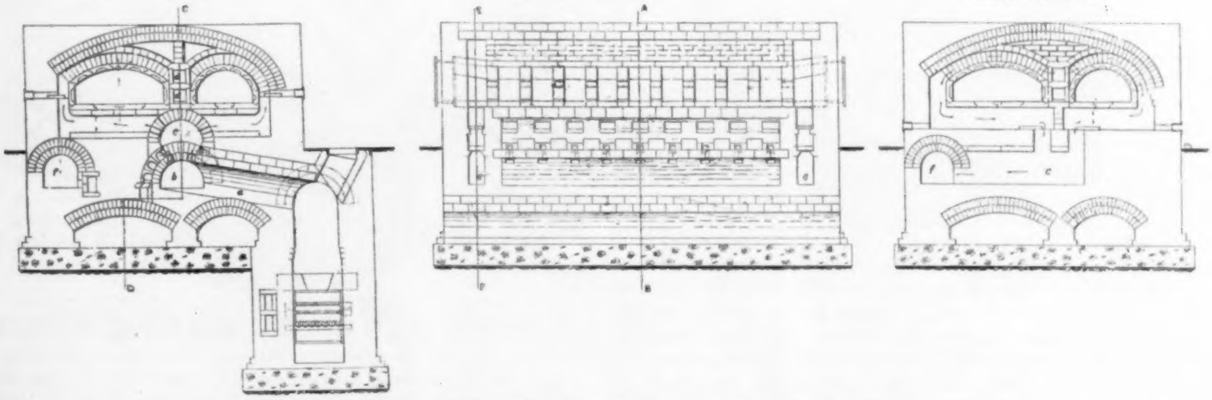
IMPROVEMENTS IN THE BATES & PEARD ANNEALING FURNACE FOR NON-FERROUS METALS

WRITTEN FOR THE METAL INDUSTRY BY D. BATES.

Broadly speaking the only alteration to the furnace as it previously existed* is that we do away with the cast iron retort chamber and substitute therefor a retort chamber built of segmental shaped fire tiles made in sections and jointed together on the site to form a tube of the correct size, and owing to the use of this fire clay tube a higher initial heat is required to penetrate it, which higher heat can not be economically obtained by the use of coal burned direct, so we substitute now a gas producer which is built below the brickwork body of the furnace in such a manner that it does not interfere with the working of the furnace, and which owing to the design and the arrangement for superheating the air utilized in properly burning the gas, enables us to heat the retort chamber extremely satisfactorily at a very low cost for fuel.

BATES & PEARD ANNEALING FURNACE AT THE WORKS OF THE BRITISH INSULATED AND HELSBY CABLES, LIMITED.

SECTION ON A.B. SECTION ON C.D SECTION ON E.F.



SECTIONAL VIEW OF BATES & PEARD ANNEALING FURNACE.

The gas producer burns ordinary common coke, which can be obtained cheaply from local gas works. The producer can also be arranged to burn hard non-bituminous anthracite coal. Of course, it will also burn bituminous smoky coal, but we do not recommend this soft coal because of the liability of sooting up the gas passages. By burning hard coal or coke there is no sooty deposit, the flues do not get blocked up and never require cleaning, and the fire clay being practically indestructible, the life of the furnace is very great.

We are not putting this on the market without experience. We put down the first furnace on this principle in the wire mill of the British Insulated and Helsby Cables Ltd. at Prescot, more than three years ago.

The B. I. & H. C. Ltd. were so satisfied with this improved method of firing that the whole of their furnaces with cast iron retorts have been rebuilt on this new principle; that is to say, two large furnaces each having two retort tubes 15 feet long in the heat and capable of annealing 50 tons per day each, and a further

*A complete description of the furnace was published in THE METAL INDUSTRY.

two tube furnace for annealing fine sizes of wire, have now been erected and are working quite satisfactorily, and we are now so sure of the improvement of this furnace that we have no hesitation in putting it on to the market and recommending to our customers who have cast iron retorts to do away with these retorts and adopt the gas producer.

We might say here that not only is the improvement very marked in the saving of expense in upkeep, but it is also most marked in the actual annealing costs for fuel. When the furnace is kept fully occupied during the 24 hours, such as it is with the B. I. and H. C. Ltd., we have obtained and do obtain in regular practice, day after day, week after week, a fuel consumption of only 3 per cent., that is 3 pounds of coke will anneal 100 pounds of metal. We know this is a vastly superior figure than can be obtained by any other method of firing, and it is a figure for annealing which we do not think has been approached by any other concern.

NOW TO DESCRIBE THE FURNACE ITSELF.

The gas producer is placed in a pit alongside of the brickwork forming the furnace body, and the stoking hole is on the floor level and can be placed either at the side or at the end of the furnace according to local conditions.

The fuel stands on fire bars made of "V" shaped iron. Down these "V" shaped bars water is allowed to trickle, which is turned into steam by the action of cooling the clinker, the steam uniting with the products of combustion of the coke forming a richer water gas. The fire door under the fire bars is always closed while working, there being an adjustable shutter on the door which enables just sufficient primary air being let in to support combustion of the fuel. This door, of course, is open wide for the purposes of clinkering, but the fact of water trickling on the fire bars has the tendency of softening the clinker and getting the last ounce of heat units out of it, so that very little absolutely unburnable ash remains and the fire even when working continuously only needs cleaning out once in 24 hours, when the clinker and ash is easily removed, being quite soft and consisting of two or three bucketfuls only in 24 hours' working.

Round the outside of the producer and embedded in the brickwork thereof are secondary air channels which circulate in long tortuous passages both round the producer and round the combustion chamber, this secondary air finding entrance from the cellar where the inlets are controlled by a slide damper. The object of these secondary air passages circulating round the producer and combustion chamber is that this secondary air shall absorb as much heat as possible which would otherwise be radiated through the brickwork, and this radiated heat warms up the secondary air to an extremely high temperature, so that when it is brought to the combustion chamber where it first meets the gases from the producer, the secondary air and the gases are practically at the same temperature, and in this combustion chamber the high temperatures are first obtained.

It will be observed that the retort chamber is made up of tiles, the joints of which are protected by an annular ring of brickwork which has the effect of keeping the joints from warping or twisting, and at the same time forms a series of annular gasways through which the now high temperature gas circulates. Each of these annular gasways is controlled by a firebrick damper, operated from the outside of the furnace, and it is a simple matter to so regulate these dampers that an even heat can be obtained throughout the length of the retort chamber, after which, of course, the gases are led away through a flue to a chimney in the ordinary way. This feature of the furnace is covered by United States patent number 1,241,750, dated October 2, 1917, and by a joint patent in all manufacturing countries.

The particular arrangement will be readily followed from the following illustration (Fig. 1):

Coke is used as fuel, and the carbonic oxide generated in the producers is carried by the cross flues a to the longitudinal tunnel b, which runs parallel to the retorts, but some 2 feet below them. From this tunnel the gases pass upwards to the combustion chamber c, through nostril holes formed in the arch. As the gases pass through these nostril holes they are met by a regulated supply of secondary air, and are here ignited and burnt to CO_2. The burning gases are then led under and round the retort in 9-inch flues separated from each other by the 9-inch walls which support the retorts throughout their length, and then travel along the flue d, between the retorts, to either end of the setting. At the ends of the setting the gases pass over the retorts in the reverse direction, returning under the retorts and then down, past regulating dampers, into the cross flues e, connecting to the main flue f. The secondary air is heated up by leading it over and alongside the main flue and thence to the system of horse-shoe blocks, through which it travels to the nostril holes where the monoxide gas enters the combustion chamber.

Fig. 2 shows the double-tube furnace, which is 15 feet 3 inches from wall to wall. The furnace is provided with electric pyrometers, and any desired temperature up to 1,400 degrees F. is readily obtainable. The wire put in as coiled takes 145 minutes to travel from end to end, the time from wall to wall being 45 minutes. The furnace has an output capacity of 59.4 tons in 24 hours, with a fuel consumption of 3 per cent. by weight of the metal, common gas coke being burnt. The wire leaves the furnace perfectly bright, and with a breaking strength of 14.8 to 15 tons per square inch, and an elongation of 35 to 40 per cent.

MAGNESIUM

When the European war started, practically all of the magnesium used in this country came from Germany. It soon, however, practically disappeared from the market here and the price soared up to a prohibitive figure so that many manufacturing concerns discontinued its use. It is now being made in this country in comparatively large quantities and the price has now been reduced and is approaching that which was general before the war. It is being sold in small lots for not over $2 per pound and in large quantities very considerably below this figure.

The principal uses for magnesium are: For alloying with aluminum for aeroplane parts, where lightness is important. By the proper combination of magnesium, aluminum and other metals, in small quantities, an alloy can be produced which will reduce the weight nearly one-half below the weight of No. 12 aluminum.

Magnesium is being used more and more as a deoxidizer and scavenger for copper, brass and bronzes and a new alloy of magnesium has been prepared for use as a deoxidizer and scavenger for high grade tool and alloy steels. Another large use of magnesium is in the powdered form for light bombs and flares for lighting night attacks on the European battlefields.

A new company, named the American Magnesium Corporation,* was formed for the manufacture of magnesium and magnesium alloys in January, 1917, with plant at Niagara Falls, N. Y., and is now probably the largest producer in the United States.

*A description of this plant was published in THE METAL INDUSTRY, June, 1917.

TINNING PLANT INSTALLATIONS AND JOB TINNING

The New Standard Hardware Works, of Mt. Joy, Pa., announce the addition to its plant and organization. After many years of practical experience in the tinning of steel, grey and malleable iron hardware they have perfected a tinning process which they state is second to none as regards production, quality and tin savings. The addition to the plant is an increase equipment for all kinds of hot tinning of grey iron, malleable iron, steel and brass stampings, etc., and in connection with this new addition they are in a position to take care of increased quantities of hot tinning and solicit orders.

The new organization is a department especially qualified to advise intelligently on the outfits, installations and any installations and any information regarding tinning plants. This department will not only advise how corrections can be made in present methods as to save money and increase production, but is well qualified to quote on complete tinning plant installations.

The Standard Company solicits inquiries both on job tinning and tinning plant outfits.

HANDY & HARMON ROLLING METALS

Handy & Harmon, producers of silver sheets, anodes, etc., whose general offices are at 59 Cedar street, New York, announce that they are prepared to undertake the rolling of aluminum, brass, copper and other non-ferrous metal sheets at their mills at 29-31 Gold street, New York, and at Bridgeport, Conn.

THE FINISH THAT COUNTS

By Arthur J. Roth, Vice-President Foot Manufacturing Company, Jersey City, N. J.

Good looks stop and hold the eye. Attractive wares are easier to sell. So the maker wants the goods to have the right finish. That's why a prominent manufacturer of a nationally known article pays so much attention to the finish of his product.

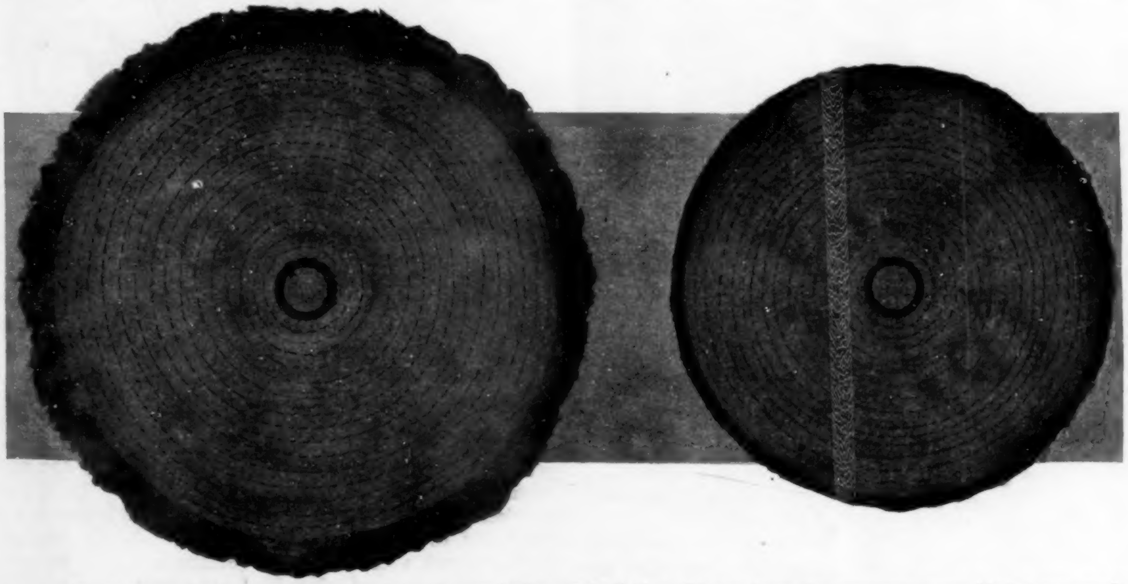
In the story entitled "Over the Counter," circulated among their trade, they emphasize this one point very clearly. "Our product is striking in appearance—it pleases the eye. We are cranks on finish. The surface must be right, the plating even, the polish brilliant. In our eyes any detail is important that improves the quality of it and makes it easier for the retailer to sell."

THE HOME OF THE FOOT FELT WHEELS, COTTON BUFFS AND CANVAS WHEELS, JERSEY CITY, N. J.

These people have made a big success and have traced it to the article itself. It is made right and given the "finishing touches" which means sales to them; and materials used are a big feature in producing the right finish. One of the most important of these is cotton buffs. The sturdy bleached buff for heavy stove work, etc.—the softer buff for light work, and the full soft, long-wearing loose buff for final finishing and for coloring.

How many persons using buffs realize the tremendous stress laid on a buff by the revolution of the lathe: that if the speed of a 14-inch buff, as turned out at the usual rate in our industry, was compared with the speed of the Twentieth Century Limited, the buff would travel from Chicago to New York and back again before the "Century" would arrive at the Grand Central Depot.

To get the best results under all sorts of conditions it is important that the material used in the manufacture of buffs is of the right kind—the best material is essential. Of course, it is a fact that the sewed buffs, in which large pieces are used inside, will give the best results and wear longer.



The buff on the left side has been burned very badly. Tripoli that did not have the necessary waxy binder was used. The buff on the right was worn down right, there was no burning. Rhodes tripoli was used. It contained select tripoli powder and stearic acid which is the basis of pure high grade tripoli. Use good tripoli and you will profit. It will save your buffs.

Most buyers judge a buff by the outside appearance and it is surprising the poor grade of material and the small ends and waste found in some buffs when opened, which appear to look

all right from the outside. It is a good idea to cut a buff wide open and examine the contents inside. The larger the pieces used the better the buff and the longer it will stand up and give service.

Next to the merchandise is the skill that is used in the making of the merchandise and the good intent of the maker. The making of the sewed buffs, although simple is very interesting. The many pieces composing the sewed buff are skillfully laid at different angles in a form of the required size. The employees are careful that the edges of these pieces do not overlap and that no seams are produced or uneven places which would unbalance the finished buff. This operation is done very quickly and it is surprising the speed which is made and the skill which is required to get all the pieces in even shape. Only experienced help can do this sort of work.

These loose forms are now ready for the sewing. They are

THE OPERATOR IS USING RHODES LUMP PUMICE WHICH IS SO LIGHT IN WEIGHT IT WILL NOT INJURE THE WHEEL AND AT THE SAME TIME TAKE OFF THE NECESSARY MATTER FROM THE BUFF.

placed on an automatic sewing machine which sews them very closely starting at the outer edge; the buffs revolve in a circular manner, at the same time the machine stitches about ⅜-in. apart until the center is reached, close to the arbor hole. Before leaving the plant to be shipped to the user, each buff must be carefully inspected and examined to see that it is all right, avoiding any unnecessary balancing and extra work for the user.

The making of loose buffs is, of course, much simpler than the sewed buffs. They are made of large pieces and whole layer goods sewed only near the arbor hole, to hold the pieces together. The best of materials must be used to give the user a buff that will stand up and produce the right finish at the least expense. It is important that the buff be made of good material of the right count and the proper twist of each strand or thread in the goods. This is really the life of the buff and much depends on it. It means that when you use a buff of this kind you get the most out of it under all sorts of speeds and uses that a loose buff is put to.

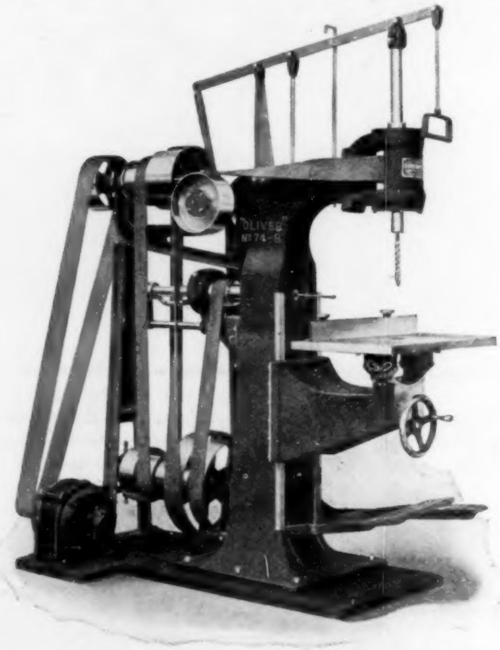
The material comes in long strips, yards long. These are automatically laid over back and forth by machinery in the proper number of layers. Eighteen is the standard on loose buffs. These are then die cut into the proper shape and size. They are then sewed near the arbor hole.

The Foot plant is operated under sanitary conditions. The skilled hands work in plenty of sunshine and fresh air. This you know is very important. It produces a spirit that counts in the long run. There are rest rooms at their disposal and everything provided for their comfort. They are also relieved by rest periods, morning and afternoon, which makes them contented. They take a great deal of interest and pleasure in turning out good buffs.

NEW WOOD BORING MACHINE

The machine shown in the cut, known as the No. 74 Universal vertical and horizontal wood boring machine, has been designed by the Oliver Machinery Company of Grand Rapids, Mich., and in order to meet the demand for a heavier and more universal boring machine. Both the vertical and horizontal spindles are very heavy, mounted in ball bearings and can be fitted to carry a three-jawed chuck, an innumerable variety of bits, fly cutters, special cutters and little pattern makers and so forth.

These machines are made in several styles, as, for instance, No. 74-A which operates at one speed only, while No. 74-B has a four speed countershaft pulley into the machine and will operate



UNIVERSAL VERTICAL AND HORIZONTAL WOOD BORING MACHINE.

at four different speeds, using a constant speed motor or being belted to a constant speed shaft. Some of the specifications that meet both machines are as follows:

Regularly bored to take ½ inch straight shanks, but when so ordered may be threaded to receive a three-jawed chuck. Spindle is 1⅞ inches diameter, slides in a sleeve formed by the driving pulley which has extended ends. These ends are fitted to very large and substantial ball bearings. Vertical travel 12 inches. Pulley 5 x 4½ inches. No. 74-A has single speed of 3,000 r. p. m.; No. 74-B has four speeds, 968 to 3,450 r. p. m.

Takes ½ inch straight shank, but may be arranged differently when so ordered. Slides in a sleeve formed by the pulley which is fitted with ball bearings of ample size. Is sustained by a bracket fastened to the column. Has 7-inch travel at a maximum height of 16 inches from top of table. A foot treadle moves it forward and a coiled spring returns it to its normal position. Pulley 4½ x 4 inches. No. 74-A has single speed of 3,000 r. p. m.; No. 74-B has four speeds, 968 to 3,450 r. p. m.

Is 18 x 30 inches, with a vertical adjustment of 17 inches obtained by hand wheel and screw. Table tilts up to 40 degrees to or from the column and 30 degrees to right or left. Rockers are accurately machined and graduated to show degree of tilt. Table has two slots to receive the fence which can be easily removed when not desired.

These are finished all over and have ball bearings of large size.

Those on No. 74-A machines are independently adjustable to suit various sizes of motor pulleys.

With the No. 74-A machine either a 900 r. p. m. constant speed or a suitable adjustable speed motor is mounted on the sole plate in place of the countershaft. With the No. 74-B machine either an 1,800 r. p. m. constant speed or a suitable adjustable speed motor is mounted on an extension of the sole plate and belted to upper drive shaft.

ST. LOUIS POLISHING MACHINE

Among the extensive line of grinding, polishing and tapping machinery described in Catalog 15 of the St. Louis Machine Company, St. Louis, Mo., appears the No. 10 polishing machine shown in the illustration. This machine has been designed to be the best plain bearing machine that it is possible to build. The bearings are milled and fitted the same as in an ordinary engine

ST. LOUIS NO. 10 POLISHING MACHINE.

lathe. They have large oil cellars, and are chain-oiling. The specifications for this machine are as follows:

Diameter of arbor in collars, inches	1¼
Diameter of arbor in bearings, inches	1½
Length of arbor, inches	54
Distance between wheels, inches	44
Length of bearings, inches	7
Height to center of arbor on bench, inches	10
Height to center of arbor on column, inches	39
Size of base of head, inches	9x10
Size of base of column, inches	16x21
Size pulley, inches	5x 5
Size C. S. drive pulley, inches	18x 5
Size C. S. T. & L. pulley, inches	8x5½
Drop of countershaft, inches	10
Size of shaft, inches	1½x40
Weight of head, lbs.	150
Weight of column, lbs.	150
Weight of countershaft, lbs.	200
Weight complete, lbs.	500

One of the principal features connected with the St. Louis line of grinding and polishing machines is the self contained countershaft which it is claimed affords several advantages over the detached type, where it is convenient to place the machine near the line shaft. One of the most apparent advantages is the avoidance of the necessity of attaching the counter to the ceiling and lining it up. Another one of the most important advantages claimed for this type of countershaft is the very smooth running of the wheels. The belt strain being down against the body of the machine gives the wheels the smooth running motion, which it is impossible to get when this class of machine is belted up. Catalog No. 15 contains descriptions, and illustrations of a number of other machines of this class manufactured by this company and copies of it may be had by corresponding with them.

PURE SHEET NICKEL—COLD ROLLED

By Stanley M. Tracy, Driver-Harris Company, Harrison, N. J.

During the past few years there has been a great deal of discourse as to the proper metal to be used in the manufacture of cooking utensils owing to various objections to every metal mentioned. After considerable experimental work, pure nickel articles were produced a short time ago, and some of the largest hotels in this country, as well as abroad, have completely equipped their kitchens with utensils made of this metal on account of its various excellent features.

Pure solid nickel must not be confounded with the much inferior metals usually sold as nickel. This as a rule, for cooking utensils, is made of iron with a thin coating of nickel, which in a short time wears off, leaving the articles unserviceable and worthless.

Pure nickel does not rust or oxidize, and consequently every danger of poisoning, generally caused by verdigris, is eliminated. Furthermore, the tedious and expensive tinning required for copper and other utensils, which, by the way, also necessitates the use of a larger number of vessels, is entirely abolished.

A further advantage of pure nickel is that the cooking is done quicker than with enameled or copper pans, nickel being altogether a better heat conductor. In the case of aluminum, while this metal is a better heat conductor than nickel, the nickel utensils are made of a thinner material, which more than overcomes the difference. The fine, silverlike appearance of pure nickel does not change in use, and the cleaning of these utensils is as easy and simple as possible, hot water or soda being quite sufficient.

The great objection to the use of enameled ware is due to the cracking of the enamel, whereby small particles get into the food products, when they have the same effect on the stomach as ground glass. This also affects the wearing qualities of the articles.

In comparison with aluminum, the melting point of which is about 1,200° F., pure nickel has a melting point of about 2,600° F., and the objection to the metal being softened under use would be overcome. Nickel is also much more resistant to the action of the acids found in food products than aluminum. Aluminum also becomes oxidized when used and a film forms on the outer surface, which gives it a greasy feeling. Pure nickel is entirely free from this objection and can be cleaned very easily.

Utensils can be drawn out of one piece of pure solid nickel sheet, making a seamless article, which insures a higher standard of durability, the metal being as hard and tough as steel and therefore being everlasting.

Driver-Harris Company, Harrison, N. J., are now producing pure nickel sheets from which these products can be manufactured, and have found that there is a large use for nickel, among which are slicing machines, which are used for slicing meats and vegetables, parts of bleaching machinery, lead-in spouts on filling machines for canned goods, butter-cutting machinery, valve disks, water meter gear trains, inner shields of sterilizers and parts of filters, dairy machinery of all kinds, parts of chemical machinery, soap cups, centrifugals, meat choppers, parts of ice-cream freezers; in fact, there are any number of uses for the metal where a bright, clean, non-corrosive and non-tarnishable metal is required.

POLISHING AND LAPPING MACHINE

A new type of machine made by the Harvard Machine Company, Cambridge, Mass., is designed for polishing and lapping. These machines are made in two styles—No. 1 has a No. 2 Morse taper in the spindle, and No. 2 machine, which is designed to use standard spring chucks up to ½ inch hole. The specifications for a Harvard polishing and lapping machine are as follows:

Height to center of spindle	6 inches
Diameter of spindle	1¼ "
Length of bearings	2½ "
Diameter of pulleys	4 "
Face of pulleys	1½ "
Base	10½x7½ "
Weight	55 lbs.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTRO-PLATERS' SOCIETY

New York Branch.—Meets second and fourth Fridays at 32 Union Square, New York. Thomas B. Haddow, president and William Fischer, 300 St. Anns avenue, New York, secretary.

The two meetings for the month of January were well attended and the subjects of discussion were brass solutions, nickel and cyanide copper solutions, and the reason for cleaning nickel anodes. William Voss exhibited some samples plated in a zinc solution which appeared to be very fine, while Thomas B. Haddow had a novel sample of work which had been plated in a gold solution containing nickel anodes. Other samples of finishes were exhibited. Mr. Voss reported to the members that Sergeant Joseph Haas is on his way "over there."

An attractive program of timely subjects by prominent speakers has been secured for the banquet of the New York branch to be held at the Broadway Central Hotel, Broadway, near Fourth street, at 7.30 p. m., February 23, 1918.

The Banquet Committee announces that they desire members to send samples of finishes for exhibition purposes and that all articles should be tagged with the name and address of the sender and forwarded to William J. Schneider, chairman of the Banquet Committee, Broadway Central Hotel. These samples will be taken care of by a committee and returned to the sender after the banquet.

Tickets for the banquet are $2 and can be obtained from Secretary William Fischer, 300 St. Anns avenue, New York, or from any member of the New York branch.

St. Louis Branch.—Meets third Saturday of each month at Public Library Assembly Rooms, H. H. Williams, 4156 Botanical avenue, St. Louis, Mo., secretary.

The fifth annual event of this branch in the form of an informal dinner and open meeting was held on January 19 at the American Annex. The members of the branch did not attempt the usual "big doings," as Secretary Williams expressed it, but practiced conservation as all good citizens are expected to do, even to the extent of closing at 10 p. m. to conform with the request of the Fuel Administrator, although this did not interfere with the standard set by former events. President H. J. Richards, in his usual manner, made a lengthy speech, not only mentioning the work the branch was doing, but also the questions that were printed on the back of all tickets and which were as follows: 1. What is the black coating or scum which forms on a nickel anode? 2. Is it a waste or is it necessary? 3. Can any use be made of it? 4. Does it form more in certain solutions. 5. Does it form more on certain makes of anodes? 6. Has the temperature of the solution anything to do with it? 7. If it is waste, how may it be avoided? Several papers replying to the above questions were read from William Voss, F. J. Liscomb and W. E. Heil, while several of the members present also gave their views on the questions. H. Deubelbeis presented a paper on zinc plant and exhibited some of the work he is doing to help win the war. A letter, fifteen feet long, contributed by all present, was sent to the former secretary, Frank Rushton, who is at present a sergeant at Fort Sill, Okla. Messages were received from Walter Fraine, George B. Hogaboom, Charles H. Proctor and Oscar E. Servis.

The Driver-Harris Company, Harrison, N. J., on the night of January 31, suffered a loss by fire of their insulated wire and electrical cord departments. These buildings were completely destroyed, but the company's business in the production of resistance materials, castings, cold rolled strip, nickel sheet and other products is not in the least interfered with and business continues as usual.

Providence Branch—Meets second and fourth Wednesdays at 26 Custom House street, Room 16. John McDonough, 16 Prairie avenue, president, and Albert J. Lemrise, 124 Waverly street, secretary.

The two regular monthly meetings were held January 9 and 23. The first meeting was devoted mostly to business transactions and the initiation of new members. At the second meeting, after the initiation of E. Silva of Boston, Mass., the branch discussed the problem of cleaners, which had been suggested by Mr. Senecal at a previous meeting. Mr. Senecal explained his method of cleaning and preparing his work for plating, and was interrupted several times by members desiring further information. The president, John McDonough, followed by explaining his method and also by furnishing the branch with formulas for electro-cleaners that he is using at the present time.

Many members took part in the discussions, and a great deal of information was gained. The Providence Branch is growing very rapidly in membership, due no doubt to the very instructive and interesting meetings.

Indianapolis Branch. Meets second Saturday of each month at the Hotel Denison, Louis Mertz, 1725 Union street, Indianapolis, Ind., secretary.

At a special meeting held February 2, it was decided that the business meetings of this branch would be held at the Denison Hotel and the laboratory meetings will be held at the Manual Training School. A short paper on some experiences with nickel solutions, written by Louis Mertz, was read and discussed. One applicant was elected to membership.

AMERICAN FOUNDRYMEN'S ASSOCIATION

The War Service Committee of the American Foundrymen's Association has appointed C. E. Hoyt, of Chicago, Ill., secretary and has established offices in the National Union Building, 918 F. street, N. W., Washington, D. C. From these headquarters will be directed all of the committee's activities in connection with co-operation with the government. Sub-committees on malleable and gray iron castings already have been named and a sub-committee on non-ferrous castings is being selected. A questionnaire has been prepared and will be mailed out to all of the foundrymen of the United States and from the data thus obtained, a survey of the foundry trade of this country will be made. Information is being sought on the melting equipment, capacity, fuel capacity, etc., of all castings plants and when compiled this information will be available to all of the purchasing agents of the different government buying departments.

R. A. Bull, Duquesne Steel Foundry Company, Pittsburgh, Pa., chairman of the American Foundrymen's War Service Committee and a Major in the Officer's Reserve Corps, has resigned, having been called for active duty. He has been succeeded by H. D. Miles, vice-chairman, Buffalo Foundry & Machine Company, Buffalo, N. Y.

INSTITUTE OF METALS

The annual general meeting of the Institute of Metals will be held in the rooms of the Chemical Society, Burlington House, W., London, England, March 13 and 14, 1918. The presidential address will be delivered and several papers read and discussed on March 13, while further papers, including the Fourth Corrosion Report, will be read on March 14.

A ballot for the election of members will be held in connection with the meeting and forms of application for membership should be returned not later than noon on March 6 to G. Shaw Scott, secretary, 36 Victoria street, Westminster, London, England.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

Commissioner Wm. M. Webster reports that the spring meeting of the association has been set over one week, and will be held at the French Lick Springs Hotel, French Lick, Indiana, on Wednesday and Thursday, March 27 and 28.

METAL MEN IN THE SERVICE OF THE ALLIES—SERIES II

THE HONOR PAGE

THE METAL INDUSTRY has always been anxious to record the news and doings of men and things prominent in metal affairs. To this end there was started in 1917 a series of pages to be called honor pages and two of these appeared in May and June which were devoted to the men on the Government's Metals Committees. In January of this year was published the first of the series of military honor pages dedicated to the heroes of the great war who are offering their lives for democracy. In this issue we publish series II and THE METAL INDUSTRY invites any one in the metals trades who may be connected with the service to send in name, address and photo for use in future honor pages.

COLONEL AMBROSE MONELL.

Colonel Monell is 45 years old and a graduate of Columbia, School of Mines, '96. In the fall following his graduation he connected himself with the Carnegie Steel Company in Pittsburgh, Pa., and from a very subordinate position worked himself to engineer of tests and finally to assistant to the president. In the spring of 1902 he left the Carnegie Steel Company to take the presidency of The International Nickel Company, New York, which position he retained until last fall. At that time he accepted a colonelcy in the Signal Corps of the Regular United States Army. He is at present serving "somewhere in France" on General Foulois' staff.

Adolph Bregman, metallurgist, has enlisted in the National Army and has been stationed at Camp Upton, L. I., N. Y., since October 1, 1917, but expects shortly to be transferred to the Officers' Training Camp at Petersburg, Va.

MAJOR WALTER C. ALLEN.

Major Walter C. Allen, who is 41 years old, was born in Farmington, Conn. As any other boy might have done, he entered the employ of the Yale and Towne Manufacturing Company, Stamford, Conn., 26 years ago as a truck-boy in the stock room. In 1909 Mr. Allen came to New York as general manager in charge of selling and advertising, and in 1914 he was elected vice-president of the company. In 1915 he became president.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

Rockey Massicottte has accepted a position as foreman of the plating, polishing and lacquering department of the C. J. Root Company, Bristol, Conn.

J. A. Sinnott, general superintendent of Brown's Copper & Brass Rolling Mills, Limited, New Toronto, Ontario, Canada, has accepted a position with the Cleveland Brass & Copper Company, Cleveland, Ohio.

Edgar S. Fassett, formerly general manager of the United Traction Company, Albany, N. Y., has become associated with Goldschmidt & Forbes, Inc., 90 West street, New York, as a director and secretary.

E. F. Wood has resigned as first vice-president of the International Nickel Company, New York and **Robert C. Stanley**, general superintendent of the Bayonne works, has been elected to succeed him.

Frederick W. Nettleton, for the past eight years superintendent of the Waterbury Clock Company, Waterbury, Conn., has resigned to accept a position as assistant superintendent of the Bristol Brass Company, Bristol, Conn.

Charles F. Brooker, of Ansonia, Conn., president of the American Brass Company, Waterbury, Conn., was elected president of the Turner & Seymour Manufacturing Company, of Torrington, Conn., at a meeting of the directors of the company held in Torrington January 22. Mr. Brooker will succeed L. G. Kibbe, who resigned the presidency of the Turner & Seymour Manufacturing Company, to become vice-president and general manager of the Stamford Rolling Mills Company, Stamford, Conn.

Harry Wright has sold his entire interest in the Stamford Rilling Mills Company, of Springdale, Conn., and has resigned as vice-president and general manager. L. G. Kibbe will succeed Mr. Wright as general manager. Mr. Wright will devote his time to the Consolidated Rolling Mills & Foundries Companies of New York and Mexico, of which he is president.

DEATHS

WILLIAM A. McADAMS

William A. McAdams, 69 years old, the inventor of McAdamite, a metal used in the making of strong aluminum castings, and a member of the firm of John McAdams & Sons, 978 Kent avenue, died January 11, 1918, at his residence in Bay Shore, L. I. Mr. McAdams was born in Boston, Mass., on November 15, 1849, the son of John McAdams and Louisa Ruth Brown, and was formerly a resident of Clifton place, Brooklyn, N. Y., for many years. He had lived at Bay Shore for about ten years. He was a pioneer in the invention and making of aluminum alloys for strengthening that metal for commercial usage. Mr. McAdams is survived by his widow and five stepchildren.

Frederick A. Driver, one of the founders of the Driver-Harris Company, Harrison, N. J., died January 23 at the home of his daughter, Mrs. Arlington Bensel, East Orange, N. J. He was 82 years old and a native of London.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

BRIDGEPORT, CONN.

FEBRUARY 11, 1918.

Bridgeport was perhaps better favored than most cities of its size in the United States during the week of the Garfield order. Fourteen plants were in full operation, so that the number of idle men was not nearly as many as was expected. The plants operating were: The Remington Arms, the Union Metallic Cartridge Company, the Bridgeport Brass Company, the Liberty Ordnance Company, the Lake Torpedo Boat Company, the American and British Manufacturing Company, and the Locomobile Company; also several smaller concerns who have Government subcontracts from some of the plants mentioned above.

When it became generally known that these big plants were in operation, there was a universal feeling that Bridgeport was going to come out of the Garfield order not half bad. Considering the importance to the nation of the product of these plants it was not too many to be put to work. The exemptions granted meant that twenty thousand operators were employed. It is estimated that the number of factory operators in this city is about sixty-three thousand. Only twenty thousand operators, however, were working that week, because under the exemption order the factories were allowed to work only on war orders.

At the Belton Machine Tool Company, under exemption, only one department was in operation. That was a department which was working on army contracts. But, on the other hand, most of the exempted factories were working one hundred per cent. on war orders, such as the American and British Manufacturing Company, the Bullard Machine Tool Company, and others. And a few of the factories were working overtime. The Bridgeport Metal Goods Company and the Lindstrom Die Tool and Gauge Works received instructions to continue operations on all work for the ordnance department by wire direct from Mr. Noyes, who is next in authority to Dr. Garfield. The number of plants working on war orders gradually rose to twenty instead of fourteen and the industrial conditions here eased up materially, although only parts of most plants were entirely operating. The Pequonnock Foundry and the A. H. Nilson Machine Company were later added to the exemption list.

The crisis in the coal situation, as it affects Bridgeport, has been reached. Six plants engaged in turning out work for the United States Government have been compelled to suspend operations because of the lack of bituminous coal, and it is expected that other factories will be forced to shut down indefinitely or close during short periods during the months of February and March, as conditions become even more acute. While thousands of tons of both hard and soft coal are in barges ice bound in the harbor, not one pound can be touched, as every bit is consigned to cities east of Bridgeport.

A great problem faces the manufacturers of this city. The heads of the big industries have been constantly at work trying to find the primal causes which underlie the constant shifting of labor in this city in order to make a concerted effort to overcome them. The general opinion seems to be that the bad housing conditions of the city are the prime factors in the situation. The manufacturers of Bridgeport in presenting a plea for Government aid in providing housing accommodations for war workers, stated that there are at present fourteen thousand peo-

ple in this city in need of homes. Secretary of War Baker sent an expert, G. H. Dorr, to investigate the facts. He agreed that conditions were fully as bad as represented and was astonished at the high rentals and the terrible state of overcrowding in factory districts. The great plea put up by the manufacturers is the great decrease in production due to the shifting class of inefficient labor which pours into Bridgeport these days. Figures vary in the different plants, but the story is ever the same. It is necessary to "hire and fire" anywhere from two to five men to get one good one. This keeps the factories in a constant turmoil. The matter is becoming one of national interest, because Washington is looking to Bridgeport for too many war supplies to allow labor conditions here to go from bad to worse. It is a serious matter when such a concern as the Lake Torpedo Boat Company, working day and night on Government orders, hires four thousand four hundred men in ten months in order to get six hundred reliable employes; when the Ashcroft Company, with an average payroll of one thousand employes, has to hire two thousand four hundred men in the course of a year in order to keep one thousand on their books. The War Department is very much interested in the situation, and the present report of Mr. Dorr will probably throw some light on possible solutions of a very distressing problem.

The following statistics of industrial plants and their relation to war work will be of interest at this time. Bridgeport has a total of one hundred and eighty-five factories. The number doing direct Government work is fifty-seven and indirect seventy-eight, making a total of shops on Government work one hundred and thirty-five. The number of employes in the factories amounts to sixty-two thousand two hundred and eighty-five.

Women have begun to fill the places of drafted men in all Bridgeport factories and there is every indication that there will be a rapid increase in the number of women employed in departments seldom before open to female labor.

The Modern Manufacturing Company of Bridgeport has purchased the entire equipment, including machines and tools, from the Esda Manufacturing Company, of New York City. Auto trucks are moving this machinery from New York to Bridgeport. The Modern Manufacturing Company is getting out plans for a third-story floor space, to be 50 x 100 feet. This company was organized about two years ago by Frank E. Seeley, president and treasurer, and Claude A. Herman, secretary and general manager. The business has increased so that now between sixty and seventy men are employed in the manufacture of special tools, jigs, fixtures and special machinery.—L. M. P.

NEW BRITAIN, CONN.

February 11, 1918.

Having recovered from the shock which followed the drastic order of the fuel administration to close down for five days, and then every succeeding Monday for ten weeks, but still worried for fear of further drastic action resulting from the fuel shortage, New Britain manufacturers are now devoting their entire efforts to speeding up production and at the same time co-operate with the war department and the fuel administration. Today, more than at any time since the beginning of the great war, this city is a war manufacturing municipality as practically every concern, big and small, is engaged in doing some work that ultimately helps the United States Government and the Allies in the prosecution of the war. Thus far, the New Britain Machine Company, where anti-aircraft gun mounts as well as other government work is being turned out, is the only concern to receive total exemption from the fuel administration's closing. This plant is running night and day and is guarded both within and without with double lines of guards. Already the United States government has stepped in to speed up the work and a new one-story factory building, 340 by 70 feet, is about to be built. This new factory building will be owned and occupied by the Machine Company, but will be directly under the direction of the government and ordnance department men are here to superintend the work. The only other local concern that is at all noticed by the war department officials relative to exemption is the Corbin Screw corporation where certain departments engaged in working on a particular and specified government order are being permitted to work all day Mondays without thought of the closing order.

At the North & Judd Manufacturing Company, where large government orders are being filled, the officials have not been granted exemption, nor has the Traut & Hine Manufacturing Company, likewise on government work. At both of these plants, however, the officials are intent upon speeding up production and certain changes in the working hours may be necessary. The P. & F. Corbin division of the American Hardware is also engaged on a monster war order, having to go with hand grenades, and to keep abreast of the work certain individual departments have been working overtime since being permitted to reopen for work on January 23. Albert F. Corbin, president of the Union Manufacturing Company, states that his concern plans no other change in the working schedule than has been in order for the past two years. "We have been working overtime for the past two years to keep up with our orders," he states. Landers, Frary & Clark, although not regarded as a war plant, is doing much war work on canteens, bayonets, trench knives and other army utensils. At this concern it is said that certain products for which so-called stainless steel is used in their manufacture must be abolished for the time being as the government has commandeered the entire output of this metal.

The Stanley Rule & Level Company, manufacturers of builders' hardware, particularly planes, levels, hammers, saws, bits, squares, etc., has been compelled to change its working hours because of the fuel shortage. Instead of working one shift of 10 hours, the plant has been divided so that it operates two shifts of eight hours each. The saving in coal comes about as a result of heating only one half of the factory to the maximum degree at a time, thus doing away with the necessity of operating a second engine which consumes large quantities of coal. The single engine used is not powerful enough to operate the entire plant and heat it at the same time.

The G. E. Prentice Manufacturing Company, one of the smaller but thriving concerns here, manufacturing buckles, harness trappings, etc., is very busy and has several large war orders. Ordnance department men are daily at the factory to oversee the work.

The Stanley Works, too, in addition to doing its work in putting out enormous quantities of cold rolled steel for the government or its subsidiary concerns, is now engaged in manufacturing the metal parts of a new and effective gas mask for the use of the army.—H. R. J.

PROVIDENCE, R. I.

February 11, 1918.

The first month of the new year has certainly been one well calculated to try the patience, ingenuity and nerves of about everybody identified with the metal trades because of the additional burdens that have been put upon them by reason of coal conservation, labor shortage, freight embargoes and other problems. The five-day closing called for by the Federal Fuel Administrator was faithfully observed by practically every metal-working plant, as also the "heatless" Mondays. While some of the concerns caused the loss of pay to fall upon the employees a majority paid their help in full for the five days.

Business continues good with practically all lines of metal plants with nothing to indicate any cessation within the next few months. Among the manufacturing jewelers there is perhaps the greatest activity, at least the most interesting and important, brought about by the possibilities of this industry being curtailed as one of the "non-essentials." To meet this condition many of the manufacturers are making active canvass to secure sub-contracts on metal parts for government contracts so as to maintain the shop organizations.

The Metal Products Corporation property on Thurbers avenue, Eddy and Blundell streets, has been sold by the receivers, Henry Fletcher and Joseph P. Burlingame, to the E. M. Dart Manufacturing Company, for $100,000, of which $61,000 is in cash and the balance of $39,000 on outstanding mortgages. The transaction was put on record at City Hall about the middle of the month.

The Universal & Plate Wire Company, 71 Peck street, Providence, has leased three floors of the brick building at 109 Summer street, formerly owned and occupied by the United Wire & Supply Company, which recently removed to its new plant in Auburn. Extensive alterations, repairs and improvements have been made to the plant.

Building permits have been granted to the Nicholson File

Company to build two one-story additions of brick to its plant. One will be 42 by 100 feet and the other 30 by 125 feet. An evidence of the greatly increased business that is being done by this company is found in the payment on January 1 to its stockholders its regular quarterly dividend of four per cent, with an extra dividend of 11 per cent, or 15 per cent in all.

The Fairmount Foundry Company has commenced the erection of an addition to its plant on Second avenue, Woonsocket. The structure is to be of wood and will be 75 by 80 feet and will cost about $6,000.

The Metals Corporation has been incorporated under the laws of Rhode Island, to be located at Providence for the manufacture and dealing in metal products. The capital stock is $100,000, divided into 1,000 shares of $100 each. The incorporators are Thomas R. Kilkenney, H. W. Kilkenney and T. C. Foster.

James J. McKenna, manager of the City Brass Foundry of Pawtucket, on New Year's Day presented $50 in gold to every employe of the plant. W. H. M.

ROCHESTER, N. Y.

February 11, 1918.

Conditions are far from satisfactory among Rochester's diversified industries. The recent five-day shut-down, coupled with the enforced idleness of succeeding Mondays until after March, has worked untold injury to the large majority of manufacturing institutions of this city. It would seem to be impossible to estimate the financial loss to industrial Rochester. At least, none of the big manufacturers, the men who are in touch with the regular output of Rochester industries, will even give an estimate.

The shut-down was a thorough one and cheerfully complied with on the part of the manufacturers, but it is claimed that very little saving resulted so far as fuel and power are concerned. Besides the great financial loss sustained by the workers, contracts have been so delayed that in a large number of instances no efforts whatever will be made to catch up. In fact it has been openly stated that certain of the biggest industries of the city will not try to make up any lost time.

The railroad situation in Rochester is worse than at any time in more than a year. Shipments were beginning to become quite satisfactory toward the close of 1917, and delays in the arrival of the material were getting to be more infrequent. Now the whole system seems to be upset, so far as Rochester is concerned. Most metal users are figuring on orders being delayed from four to six weeks. Express shipments are fully as bad as freight. Because of this condition many large plants in this city have deferred ordering until the atmosphere becomes clearer.

The sheet copper market in Rochester is quiet, and quotable at 35½ cents base. Dealers can get all the copper they require at this time, but owing to the railroad embargo shipments are away behind. Most large users say they are now about a month behind in orders to date.

The market for yellow brass is also very quiet, sheets being quoted at 26½ cents base and rods 24½ cents. Red brass is in very little demand in this city.

There is no especial demand for lead at this season of the year, and the local wholesale figure is fixed at 7.75 cents. Bronze is not in active demand and is quotable at 42 cents. Market for all kinds of spelter is firm, and quoted at from 7.75 to 8c.

Aluminum prices are stiffening of late and the demand is stronger, owing to the fact that supplies are difficult to obtain. Practically all of the aluminum obtained for Rochester users comes from Pittsburgh. All of the output of the big Niagara Falls plants goes to the French and Italian military establishments, which fact acts as a certain crimp to local users. The market price for aluminum is now 50 cents.

The outlook at this time is not altogether a pleasant one.—G. B. E.

MONTREAL, CANADA

February 11, 1918.

Business conditions in the metal lines and outlook for 1918 are rather promising at this time and the different manufacturers are quite optimistic. Montreal is the center of trade for eastern Canada and has been running to full capacity in the manufacture of munitions for the past three years.

There have been no contracts issued for the past six months, and the majority of the manufacturers are now finishing up the last of their orders, and some of them are negotiating with the American Government and have representatives in Washington, D. C., at the present time, with every indication of securing orders for component parts that enter into the manufacture of shells.

The Department of Mines at Ottawa estimates the production of metals from Canadian ores for the year 1917, as follows: Copper, 113,000,000 pounds; gold, 17,000,000 ounces; silver, 25,000,000 ounces. The production of gold, silver, copper and cobalt was less than in 1916, while the production of lead, nickel and zinc was greater than the former year.

The smelters are now operating at high efficiency and the plants of the Consolidated Mining and Smelting Company of Canada are increasing their output every week. Managing Director J. J. Warren, of the above concern, reports the installation of the most modern machinery and the prompt adoption of the latest improved practicable methods. The company is now able to turn out fully as much metal with its present staff of 1,200 men as when 1,600 were employed several months ago, so that it is able to maintain its output in spite of the heavy reduction in staff due to enlistment in the army; and, moreover, a considerable economy is effected by the saving of some $40,000 a month in wages.

The plants of the company have been built primarily to take care of the peace needs of Canada in the metals it produces, so that war orders are only incidental to the successful operation of the company and not absolutely essential as in some corporations. In this connection the company will be able to continue a steady regular business when there are no more war orders to be obtained.

The Cross Sign and Press Company has been incorporated here, with a capital of $30,000, by Roberts C. McMochall, Frances E. Busch, George H. Drennan and others, to manufacture signs and metal goods.

The St. Lawrence Welding Company has opened up their new brass foundry, located at 39 Olier street. The plant has been equipped with the latest requirements and the production of castings has been started. Robert Stark has charge of the brass foundry under the direction of A. M. Barry.

A large concern has been capitalized at $99,000 and known as the Laval Industrielle, Limitee, of Ville Laval de Montreal, Quebec, with Joseph O. Dion, Alleric Cote, Emile E. Pavient, to manufacture jewelry and carry on business as gold, silver and electroplaters.

The Vickers Company, Limited, shipbuilders, are using large quantities of brass and copper products for use on their marine work which they have in course of construction.—P. W. B.

COLUMBUS, OHIO

February 11, 1918.

The metal market in central Ohio territory has been ruling steady during the past month. Demand has been fairly good, although metal-using concerns are loath to accumulate stocks and are content to buy on a hand-to-mouth policy. Stocks in this territory are sufficient for the present. Embargoes on many railroads, coupled with the bad freight congestion, are holding up shipments to a large degree and make it difficult to get deliveries.

Prices on all metals are holding up strong, although there are practically no changes from the preceding month. This is especially true of brass and aluminum. Copper is fairly active and the same is true of zinc and tin. Type metals are probably the strongest feature of the trade. Spelter is firm and other metals are holding their own.

The five-day layoff, caused by the order of the Federal Fuel Administrator, caused some disturbance in manufacturing circles and consequently a decrease in the use of metals. It had little effect on the market, however, as deliveries are so slow as to make such suspensions of little consequence on quotations. Metal-using concerns believe that the saving of fuel occasioned by the order will not pay the loss in wages and profits accruing. All of the metal-using concerns, however, followed the order without any attempt to evade it.

The Urbana Manufacturing Company, of Urbana, Ohio, has been incorporated, with a capital of $50,000, to deal in metal

specialties. The incorporators are: Harry S. Easron, Frank C. Gaumer, Joseph C. Mackery, J. H. Brown and Harold W. Houston.

The Wind Brass and Aluminum Foundry Company, of Cleveland, Ohio, has been incorporated, with a capital of $15,000, to manufacture brass and aluminum ware. The incorporators are: L. F. Wind, R. E. Hyde, F. A. Gideon, E. C. Scharff and C. W. Swartzel.

The Wendland Engineering and Metal Products Company, of Cleveland, Ohio, has been incorporated, with a capital of $100,000, to deal in metal products. The incorporators are: Joseph C. Wendland, Henry Schatschneider, Adolph Krause, Gottlieb Wildeman, Julius Bloch and Gottlieb Bloch.—J. W. C.

CLEVELAND, OHIO

February 11, 1918.

Astonishing and surprising in its effect was the order of Fuel Dictator Garfield, ordering the closing of all industry for five days and for nine succeeding Mondays, when it reached the Cleveland metal industry and allied trades. There is hardly a plant in the Cleveland district now which is not, directly or indirectly, aiding the government in war necessities production. The result has been to bring chaos upon disorder that already existed, due to the absence of plentiful supplies of coal and the inability of railroads to make or receive shipments of either raw materials or finished product. It was estimated that Cleveland factories are working on $300,000,000 war orders, most of which will be delayed by this order. Few exemptions were obtained, but these, as soon as granted, resulted in the plants resuming operations.

It is significant, however, that the move, designed to give Cleveland more coal, and in fact the entire eastern half of the country, has not resulted in any fuel improvement in this district. In fact the situation at this writing is worse than ever, and several plants threaten to close. In fact, the municipal lighting plant has closed once anyway, because there was not enough fuel forthcoming, and would have closed a second time if the White Company had not loaned some coal.

An aluminum and brass casting plant for Bellefontaine is planned by Charles Humphrey and Son. The plant will employ 40 molders. Contracts for automobiles and aeroplanes have been closed it is said. A new department, to be opened as soon as the main building is in operation, will be for nickel plating purposes. When present plans are completed the firm name will be changed to the Humphrey Bronze and Aluminum Company.

As already mentioned in The Metal Industry, construction has been started on brass, bronze and aluminum factory at Marion. Richard Lau, well known in northern Ohio metal industry circles, is the backer of the project. Contract for a new building has been let. It is expected the plant will be ready for occupancy by February 15.

Plans for manufacturing surveying instruments in a new building at Kelly avenue and East 38th street have been completed by the J. C. Ulmer Company. Operations will begin before spring, it is said.

The Ferry Cap and Screw Company is Americanizing its employees by conducting classes in English during the noon hour. Miss Mary Janecki is the instructor. E. F. Greene, superintendent of the factory, is planning to have prominent citizens address the workers on patriotic subjects after they get well grounded in the new language. This is the only school of its kind in the city.—C. C. C.

CINCINNATI, OHIO

February 11, 1918.

The fuel and transportation situation took front rank as a matter of interest among members of the metal trades in Cincinnati during the latter part of January, as it did elsewhere in the Northern and Central States. This was especially true of the suspension order, which, as first announced, affected concerns engaged in war work and work for companies with war orders, as well as it did others, whose operations were less essential to the Government. It was estimated by James Manley, secretary of the local branch of the National Metal Trades Association, that approximately 20,000 employes would be affected by the order in Cincinnati, including those working in many of the larger plants, such as the Le Blond, Lodge & Shipley, Cincinnati Milling Machine and other big machine-tool plants, as well as those in the smaller foundries and shops, to the total number of about 275 to 300. The fact that the order, in its general terms, applied to these concerns, occasioned some surprise, but there was no disposition to question the authority of the Fuel Administration or to attempt any evasion of the order. However, after preparations had been made by all of these plants to shut down, orders from Washington received by the Cincinnati Metal Trades Association resulted in eighteen plants, which for obvious reasons it is not desirable to name, being placed in operation. The order was general in its terms, and indicated that plants engaged in the production of ordnance, airplane parts or accessories, signal corps, shipbuilding supplies or materials, should not discontinue work on any of the "holidays." At a meeting of the association, presided over by President A. H. Tuechter, eighteen plants, as stated, were selected as entitled to continue operations under this classification. All others, however, were closed on the original five-day period fixed by the suspension order, and have since been closed on the Monday "holidays."

The Greaves Machine Tool Company, recently organized in Cincinnati, with a capital stock of $100,000, by W. A. Greaves, Jr., president; Matthew Hoerner, vice-president; W. H. Greaves, secretary and treasurer; and Richard Janpsch, mechanical engineer, is planning to build a large plant, 150 x 170 feet, on Spring Grove avenue.

At the annual meeting of the Eagle-Picher Lead Company, of Cincinnati and Chicago, John B. Swift was re-elected chairman of the board of directors, and other officers were also re-elected, as follows: President, O. S. Picher; vice-presidents, R. W. Evans and S. M. Evans; treasurer, T. S. Brown; and secretary, Joseph Hummel, Jr.

Patriotic addresses and optimism for the new year were features at the recent meeting of the Cincinnati branch of the National Lead Company, at which several prominent out-of-town officers of the company were present, including Advertising Manager O. C. Harn, of New York; Evans McCarty, manager of the ammunition department; H. B. Muelendyke, of New York; and A. O. Goshorn, of Louisville. William A. Dail presided as toastmaster at a dinner.—K. C. C.

DETROIT, MICH.

February 11, 1918.

The brass, copper and aluminum industry in Detroit and adjacent territory is experiencing a most decided handicap due to the shortage of coal. In order to conserve fuel, Monday of each week has been declared a holiday, and all concerns not engaged in producing for the Government are compelled to close and use no coal on that day, except that which is necessary to keep plants from freezing up. This holiday is a blessing to the brass trade and the conservation of fuel is preventing a complete shutdown. A great majority of these plants are directly or indirectly engaged in the production of munitions or other supplies needed for the war, and they have been exempted. About 150 in different parts of the city are permitted to operate on the Monday holiday. This enforced idle day will continue until March 25, and there is no prospect of a modification of the order, as it is too true Detroit is experiencing one of the most exasperating fuel famines of any city in the country. Up to about a week ago, thousands of families were without heat of any kind, and, added to this, Michigan is experiencing the most severe weather in years. The thermometer has hardly registered above zero for the last three weeks.

The enforced Monday holiday has been the means of keeping the brass plants in operation, as the coal saved by other plants shutting down is diverted to the plants engaged on work for the Government. It might be added here that Detroit is pronounced one of the heaviest manufacturers of munitions and Government war supplies in the country, and it has not reached its highest point by a long way. Many new plants are being established and the demand for skilled mechanics is the greatest ever known here. It is estimated that contracts for Government work will reach close to $7,000,000,000.

The Wise Electro Sherardizing Company is reported operating 24 hours a day. It has a process of rust-proofing accom-

plished by electro-sherardizing which forms a zinc coating. This finish, it is said, will not rust, and may be buffed to a very bright finish. It has heavy contracts from the automobile and stove companies here.

The Scott Valve Manufacturing Company, it is said, is to be the name of the Roe Stephens Manufacturing Company. They make a specialty of valves and are well known throughout the country under the old name, but believe the new style is more suited to their business.—F. J. H.

LOUISVILLE, KY.

February 11, 1918.

A number of the Louisville copper and metal working plants have been exempted from the special fuel rulings of the Fuel Administration, on the grounds that they are working on special government orders for equipment to be used by the Submarine Corporation, or the Emergency Fleet Corporation; while others have been exempted on the grounds that they are manufacturing equipment used in conserving or preventing the waste of food. This latter exemption took in several concerns manufacturing milk machinery. A number of the small foundries and casting shops without government work of any kind, or material used in manufacturing such supplies have been forced to remain closed, and the ones that are open are only allowed to make specified articles. However, at the present time the general rnn of casting work is light, and shops without special orders are not so busy as a rule but what they can handle their business in side of five days by crowding things a little.

At the plant of the Vendome Copper & Brass Works work was at a standstill for five days, but a special permit was received to manufacture milk machinery, which is the only work that the company has in hand at the present time. Hines & Ritchey were also down for five days, but are now operating on Mondays on milk machinery.

The C. Lee Cook Manufacturing Company, a concern which is handling some big government contracts on special bearings, etc., was exempted from the closing order at the outset, and has been running full time and capacity on work to be used in submarines and on steam vessels. The Independent Brass Works, which is manufacturing a lot of stuff for the Cook concern under sub-contracts, has also been exempted and will run on government work on Mondays in the future.

The market on scrap metal is fairly active with heavy brass quoted at 14 cents; light brass, 9c; tin, 85c; and lead 7c. These prices are slightly lower, except on tin, which has been jumping somewhat. On new metals sheet brass is quoted at 31½c base; tubes, 39½c.

Coke is very scarce and hard to get for heating furnaces, and this is a serious proposition for the small shops which use coke in open hearths instead of crude oil with compressed air. Coke at the present time is worth about $18 a ton, and can hardly be had at any price. The government has ordered a car shipped to one of the local plants which is working on government orders, and which was unable to find a supply.

Louisville coppersmiths are of the opinion that there will be very little additional work on alcohol distilleries, or remodeling old whiskey plants for alcohol manufacturing, due to the fact that there are more distilleries now working on alcohol than the total consumption of the country requires, and the big plants can sell at lower prices than the small ones, which will eliminate most of the small distilleries engaged in such work.

The J. J. Reilly Manufacturing Company, and the Grainger Company, of Louisville,, large concerns operating foundries for manufacturing steam and air pumps, have some big government contracts for ship pumps, and have been permitted to operate without restraint. O. V. N. S.

PHILADELPHIA, PA.

February 11, 1918.

Virtually every manufacturing industry in this city felt the effect of Dr. Garfield, Federal Fuel Administrator's order to close five days beginning midnight Thursday, January 23. About 500 employees of Fayette R. Plumb, Inc., Tucker and James streets, Frankford, felt the effects of the edict. This plant is engaged in the manufacture of edge tools and hammers for the Government, but despite this they were unable to obtain exemption. The Miller Lock Company and the Enterprise Manufacturing Company, makers of food choppers, also felt the brunt of the order.

Men in the metal industry in this city are much perturbed over the recent edict of Director General of Railroads McAdoo placing an embargo on freight except fuel, food and war supplies from the Pennsylvania Railroad east of Pittsburgh, and the Baltimore and Ohio east of the Ohio River and all of the lines of the Philadelphia and Reading. The roads were badly congested prior to the order and considerable difficulty was manifest in making deliveries, but this new order following close on the heels of the shut down order cause the metal trades to feel that with the curtailment of working hours for the week, that they are at least temporarily in a bad position to receive raw material and make shipments on finished stock.

Trade acceptances was the topic of discussion at a meeting of the Philadelphia Metal Club at their headquarters, 505 Arch street, last Tuesday. These commercial papers which are fast becoming popular after a period of inactivity since the Civil War are being endorsed by men handling all kinds of metals. Men in the trade say that since they have been using them that they have cut the cost of collection of bills about 50 per cent. and have been a large factor in strengthening the credit of buyers. L. D. Berger, a merchant and manufacturer of tin plate sheet iron, zinc and copper, is an advocate of trade acceptances and has been the prime factor in inducing the Metal Club to endorse them. Although at a meeting in December it was decided to put them into universal use among the members the forms are just being prepared and by the first of the month the members say that almost every one in the local trade in their line will be using them.

The Metal Club will obey the edict of Dr. Garfield and observe "Heatless Monday" during the weeks called for, and the offices of the club will be closed on those days.

The continuance of the price of 23½ cents a pound on copper until June 1 by President Wilson at the recommendation of the War Industries Board, has met with considerable discussion among the local trade. The fact that the agreement between the government and the Copper Producers' Committee has heretofore provided for the requirements of the government and in some measure taken care of the consumer has stimulated the demand to some extent since the announcement of the price being allowed to remain. Metal men say that there has been a waiting policy assumed for the past several weeks awaiting the outcome of the conference in Washington. They look for renewed interest and although only slight now expect it to increase. The local metal men say that the market on copper has become more stable.

Lead is reported as showing little as the month closes and prices are firmly held.

After several years connection with the sales department of the Sherritt and Stoer Company, this city, Henry M. Shaw has become associated with the Monarch Machine Company.—F. W. C.

TRENTON, N. J.

February 11, 1918.

The closing down order of National Fuel Administrator Garfield has had a serious effect upon the metal industries of Trenton and vicinity and compelled hundreds of employes to lose time during a season when business is good. The order called for the closing of plants for a period of five days to save fuel, and the manufacturers, despite the fact that they were busy, were compelled to obey the instructions from Washington. The only Trenton plants where metal is produced to come under the exemption class are: the John A. Roebling's Sons Company and the De Laval Steam Turbine Company. Both concerns are working on Government work. The Billingham Brass & Machine Company, Trenton Brass & Machine Company, Jonathan Bartley Crucible Company, Skillman Hardware Manufacture Company, Ingersoll-Trenton Watch Company, Trenton Smelting & Refining Company, McFarland Foundry & Machine Company, National Electric Plating Works, Bechtel Engraving Company, Mercer Automobile Company, Clifford Novelty Works, the Movshovitz Metal Company and the American Standard Metal Products Corporation at Bordentown were compelled to close

down completely. One big department of the Jordan L. Mott Company, where a Government contract is being turned out, was allowed to remain in operation. The order also calls for the closing down of all metal plants each Monday from now until the latter part of next March.

Another serious drawback during the past month was the shutting off of the electric current by the Public Service Corporation of New Jersey at various times of the day. The corporation adopted a ruling that current would be turned off at 4.30 o'clock each afternoon so as to relieve the strain upon the generators and allow enough current for street lights, etc. Through this order the production of the plants was greatly decreased, orders could not be filled on time, payrolls were somewhat smaller and employes became disgruntled. It was at first believed that some of the metal concerns would pay their employes half time during the days they lost through the Government fuel order, but this was not done. The men informed their bosses that they were not to blame for laying off and asked that they be compensated to some extent, but their plea was turned down. The firms announced that they already carried enough expense through the high cost of fuel, metals, etc., and could not afford to pay employes when the concerns were standing idle.

The Ingersoll-Trenton Watch Company was compelled to shut down recently before the five-day fuel order went into effect because the Public Service Corporation failed to furnish current for the operation of the machinery.

Desiring to assist in the war in other ways beside manufacturing ammunition for the army, employes of the Standard Metallic Products Corporation, which recently took over the big plants of the Standard Fuse Corporation, at Bordentown and Paulsboro, have begun raising funds for the purchase of an ambulance, which they will donate to the Government for service in France. The Philadelphia Watch Case Company, at Riverside, N. J., has resumed the manufacture of shell parts, promising the town another big business boom. The company is unable to secure the needed male labor and hundreds of additional girls will be given employment. Under the large flag of Stars and Stripes that floats daily on the flagstaff surmounting the seven-story office building of the Keystone Watch Case Company, at Riverside, N. J., now also floats the American Red Cross flag. Beneath this flag now waves to the pride of all those connected with the firm, from the president of the company to the office boys, a pennant on which appears the words: "Every Employe a Member." On the other plants of the Keystone Watch Case Company at Jersey City, Newark, N. J., and Waltham, Mass., appears the Red Cross flag and banner. All the employes of the general offices in Philadelphia and the various sales offices in all the principal American cities have also subscribed to membership in the Red Cross.

While the Keystone Watch Case Company at Riverside, N. J., has plenty of coal on hand, it had to close down during the five-day period set by the Government. The employes are engaged on piece work and therefore have no claim for any part of wages while the plant is closed. Under the federal orders railroads would not deliver coal to industries aand concerns were not allowed to burn any coal they had on hand. Watchmen in the metal plants were kept busy preventing pipes from freezing while the fires were banked.

George W. Ferrell has purchased the plant of the Trenton Chemical Company, along the Scotch Road, from Barton T. Fell.

Charles Butters, of Oakland, Cal., has purchased ten acres of land along the main line of the Morristown & Erie Railroad Company at Dover, N. J., and will erect twenty-one buildings of iron construction to be used as an aluminum bronze works. The machinery for the new plant will be shipped from California. The buildings will include a warehouse, 30 x 125 feet in size; a melting house, 50 x 125 feet; six grinding units of L shape, 30 feet on one end and 60 on the other and 10 feet wide. There will also be four bolter houses, a machine shop, six bagging buildings and other structures. A road is being made to the plant, which is on the colony plan, and every facility will be provided for the work. The power for the works will be supplied by the Morris & Somerset Electric Company. The plant will be employed in Government work and will require many hands when it is completed.

The Balbach Smelting and Refining Company will build a steel, brick and frame bonded warehouse, one story, 64 by 48 feet in size, to the Newark plant, to cost $7,000. The company will also make alterations to the copper furnace and casting machine at a cost of $4,000.—C. A. L.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Chase Metal Works, Thomaston avenue, Waterville, Conn., is building a three-story addition, 20 x 60 feet, to its plant.

The Bristol Brass Company, Bristol, Conn., is building a reclaiming plant at its factory which they expect to have in full operation in about two months.

The Rome Locomotive & Machine Works, 1012 East Dominick street, Rome, N. Y., has been merged with the Rome Manufacturing Company, manufacturers of copper and brass goods.

The W. W. Sly Manufacturing Company, manufacturers of foundry equipment, Cleveland, Ohio, is revising its engineering department catalogue files, and wishes to receive latest catalogues.

The Precision Die Casting Company, Fayetteville, N. Y., is planning to build a 60 x 60 feet addition to its plant. The company operates a brass, bronze and aluminum foundry, tool room and casting shop.

"Visitors' Night," or what is officially announced to be the annual exhibition of the School of Science and Technology of Pratt Institute, Brooklyn, N. Y., will be held this year on March 7 from eight to nine o'clock.

The construction of the new plant of the James H. Rhodes Company, of Chicago, Ill., on property recently acquired on the Kearny meadows, near Newark, N. J., is progressing rapidly. The plan will be devoted to the manufacture of pumice stone, and other abrasives.

The Two Rivers Plating Works, Two Rivers, Wis., is manufacturing fuel saving and heat-producing attachments for furnaces and boilers and is installing new equipment. The company operates a grinding room, stamping, galvanizing, tinning, soldering, plating, polishing, japanning and lacquering departments.

The General Bakelite Company, Perth Amboy, N. J., manufacturers of insulations, specialties and lacquers, has secured property adjoining its works at Fayette and Rector streets from the Roessler & Hasslacher Chemical Company. It is understood that the site will be used for expansion.

The Impervious Metal Corporation, 421 Wood street, Pittsburgh, Pa., announces that it has purchased the Alexapope Manufacturing Company of Brooklyn, N. Y., and will continue to manufacture "Alexapope" baking japan and enamels, which hereafter will be sold under the trade name of "Impervious."

The Buckeye Brass and Foundry Company, Cleveland, Ohio, report that owing to present conditions they have decided to delay the erection of two 60 by 100 feet buildings, including a machine shop, foundry and furnace room at an estimated cost of $35,000, and that just when they intend to open the question is uncertain.

The Brownsville Foundry & Machine Company, Brownsville, Pa., has been organized to operate a local foundry and machine shop. William W. and William P. Welker are at the head of the company. The company will operate a brass, bronze and aluminum foundry, brass machine shop, tool room and brazing and soldering departments.

The Cochrane Brass Foundry, East Wallace and Sherman streets, York, Pa., has leased the former York Bridge Com-

pany plant. The new building consists of a main structure 60 by 380 feet. The company operates a brass, bronze and aluminum foundry, and in addition to acquiring the above building, expects to increase its capacity.

Burdick & Son, Albany, N. Y., manufacturers, have decided, on account of prohibitive prices for building materials and construction, that they will not erect the four-story addition to their sheet-metal works. The company operates a machine shop, tool and grinding room, stamping, plating, polishing and lacquering departments.

The extensive new buildings of the Hydraulic Press Manufacturing Company, at Mount Gilead, Ohio, are now occupied, and the plant is again in operation to its full capacity. The company reports that the new equipment represents the most advanced types of metal working machinery available, and is specially adapted for the building of hydraulic presses, pumps and valves.

The Winslow Bros. Company, Chicago, Ill., whose regular line is ornamental iron and bronze work, has taken a contract for 155 mm. shells. It has been actively purchasing equipment and expects to begin the production of shells about March 1. The company has engaged an expert formerly with a Canadian munitions plant who will organize the shop and working force.

The D. T. Williams Valve Company, Cincinnati, Ohio, purchased at a sum of $300,000 the plant of the Queen City Brass & Iron Company, which will be used to supply additional facilities and output capacity made necessary by exceptionally large orders recently booked by the Williams Company. The company has also increased its capital stock from $175,000 to $750,000. The company operates a brass and aluminum foundry tool and grinding room.

The Mechanics & Metals National Bank of New York, the president of which, Gates W. McGarrah, is also president of the New York Clearing House, has prepared a booklet which is being sent to banks and business organizations throughout the country, outlining a plan for converting non-essential industries of the nation to a war basis on a gradual instead of a drastic scale. The bank takes sides against the policy that is being agitated of complete self-denial on the part of the American people. It points out that war expenses of 1918 will equal not more than 30 per cent. of the American people's income.

The firm of William O. & E. R. Sheldon will change its name to the Sheldon Company, with offices at the same address, 256 Broadway, New York. The company will continue to handle the "Quickwork" rotary shears and machinery for plate and sheet metal work, also hydraulic and chain draw benches for rods and tubing as well as a large line of plate shearing, bending and straightening rolls, punches and shears. The firm also handles the Canton Foundry & Machine Company's alligator shears in all sizes, and will establish a department for consulting engineering work, and layout and equipment of metal working shops as well as rolling mill, tube and rod mill plants.

The Baltimore Tube Company, Baltimore, Md., report that when the new building which it is adding to its plant is finished they will be in a position to produce brass sheets, whereas at present the company manufactures only brass tubing. Last year the officers of the company came to the conclusion that the time was ripe for making brass sheets, but construction work has been delayed by slow delivery of material and it is not likely that the new unit will be ready for operation by April 1, the date originally set. The Baltimore Tube Company held its annual meeting on February 5, but THE METAL INDUSTRY was unable to obtain the names of the newly elected officers before going to press.

The Glauber Brass Manufacturing Company, manufacturers of plumbers' brass goods, etc., Cleveland, Ohio, is contemplating the erection of a plant, although up to the time of going to press the Glauber Company reported that no definite site had been selected for the new building. The lease on the present plant occupied by this company expires April 1, 1918, and by that time a plant 150 by 300 feet of concrete construction will be ready. The plant will, it is stated by the Glauber Company, be an innovation in factory construction, the top floor being given over to the foundry department, the sixth floor the pattern room. The tool and finishing room will be located on the fifth floor, and on the fourth floor the packing and assembling departments. The other floors and basement will be utilized by the company.

PANGBORN CORPORATION ACTIVITIES

H. D. Gates has returned to the Pangborn Corporation, Hagerstown, Md., as sales manager, the post from which he resigned four years ago to take charge of the Mott Sand Blast Company of New York. J. F. Hull, who served the Pangborn Corporation as engineer and who was more recently in the employ of the Mott company, has likewise returned to the company in the capacity of assistant engineer. Charles T. Bird, who for the past year has been identified with the production and engineering departments of the company, has been transferred to the sales department and assigned to what is known as the home territory, with headquarters at Hagerstown. In connection with extending the Pangborn staff it is interesting to note that the business of the company has increased steadily throughout the fourteen years that it has been established, having devoted their entire efforts and facilities to specializing in sand blast and allied cleaning equipment. The company is building a foundry 150 x 100 feet and a 100 x 60 feet extension to its machine shop, as well as a wood shop, 60 x 40 feet.

Employes of the Pangborn Corporation were presented on Christmas with life insurance policies, ranging in amounts from $500 to $1,000, according to length of service. The Pangborn Corporation bears all expense of maintaining the insurance and all the employes have the satisfaction of knowing that their near and dear ones will be provided for in this amount in case of death.

H. M. LANE CO. CHANGES

The H. M. Lane Company, foundry engineers, of Detroit, Mich., have recently made several changes in their organization.

A. O. Thomas, who for a number of years has done more or less work for the H. M. Lane Company in reinforced concrete design, but who at the same time operated independently, has recently joined them. Mr. Thomas is the inventor of the Thomas reinforced concrete system, and was previously engaged as a pioneer in the beet sugar industry, having been connected with the layout and building of several plants in the United States and Canada. Mr. Thomas' organization is now merged with that of the H. M. Lane Company, thus giving the latter organization greater facilities for reinforced concrete design.

Mr. H. E. Mills, until recently chief draftsman under the works engineer of the Buick Motor Car Co., in Flint, and in charge of their recent building designs, has also joined the H. M. Lane Company staff. Mr. Mills was formerly in business for himself in Cleveland, and before that time was with Ford, Buck & Sheldon, of Hartford, Conn. He has had extensive experience in structural steel design.

The H. M. Lane Company is now prepared to handle all kinds of industrial plants, though it will continue to make a specialty of foundries and metallurgical plants and of special furnace designs. The office will remain at 707-709-713 Owen Building, Detroit, Mich.

The line of core and mold ovens brought out by H. M. Lane, of the above company, and covered by patents, has in the past been built by a contracting company known as Holcroft & Lane Company. This organization has recently changed its name to Holcroft & Company.

During the past year Holcroft & Company have built about seventy miscellaneous metallurgical furnaces and over a hundred core and mold ovens. They will continue as a purely contracting organization and have made arrangements with the H. M. Lane Company for their engineering, consulting and drafting work. The operations of the two companies, however, have been entirely divorced, and Holcroft & Company are now located at 555 Book Building, Detroit, Mich.

FIRES

The plant of the Winnipeg Brass & Fixtures Company, manufacturers of brass goods, bronze and brass castings, Winnipeg, Manitoba, Canada, was damaged by fire on January 8, with a loss of $13,000, which is almost entirely covered by insurance. The company has leased other premises almost adjoining the old plant, and will be operating again within three or four weeks.

The Driver-Harris Company, Harrison, N. J., on the night of January 31, suffered a loss by fire of its insulated wire and electrical cord departments. The buildings containing them have been completely destroyed. Its departments devoted to the production of resistance materials castings, cold-rolled strip, nickel sheet and other products are not in the least interfered with and business continues as usual.

INCREASE IN CAPITAL STOCK

The Elkhart Brass Manufacturing Company, Elkhart, Ind., has increased its capital stock from $60,000 to $150,000. The following departments are operated by this company, brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, galvanizing, brazing, soldering, plating, polishing and japanning.

The Conneaut Metal Works Company, Conneaut, Ohio, is planning to increase its capital stock from $40,000 to $100,000, with a view of increasing the capacity of its plant. The company makes a specialty of electric lighting fixtures and is furnishing the United States Shipping Board, Emergency Fleet Corporation, with equipment for 400 ships. A brass and bronze foundry, brass machine shop, tool and grinding room, spinning, stamping, plating, polishing, japanning and lacquering are the departmets operated at this company.

CHANGE IN FIRM NAME

Arrangements have been completed whereby the business of both the Goldschmidt Thermit Company and the Goldschmidt Detinning Company will hereafter be conducted by the Metal & Thermit Corporation, with general offices at 120 Broadway, New York.

The Randall Metal Manufacturing Company, 39 South Charles street, Baltimore, Md., metal workers and platers, has changed its name to the Metal Spinning & Plating Company. The company operates a grinding room, spinning, soldering, plating, polishing and lacquering departments.

The Lavigne Manufacturing Company, Detroit, Mich., has changed its name to the Commonwealth Brass Corporation, but there will not be any change in the line of products manufactured. The officers of the corporation are P. D. Dwight, president; N. A. Henwood, vice-president and general manager; Carl L. Brumme, secretary and treasurer, and C. S. Kellum, superintendent of the plant. The factory is located at 625 to 651 Commonwealth avenue.

REMOVALS

The general offices of the U. S. Reduction Company have been moved from Chicago, Ill., to East Chicago, Ind.

Owing to increased business the Westchester Buckle Manufacturing Company, manufacturers of metal novelties, has moved its factory to 1 to 7 Beach street, Mount Vernon, N. Y.

The Great Western Smelting & Refining Company, smelter and refiners of metals, Detroit, Mich., has moved into its new and extensive warehouses at 709-719 Loraine avenue, Detroit, Mich., where they will be in a position to take care of any requirements.

The Damrow Brothers Company, Fond du Lac, Wis., manufacturers of galvanized and other sheet metal containers and stampings, has moved into its new plant at Brooke street and Western avenue. The plant includes a complete tin rolling mill in order that the company may overcome the shortage of sheet tin by rolling its own supply from the rough pig.

The Detroit, Mich., offices and warehouses of the United Smelting and Aluminum Company, New Haven, Conn., have been moved from 1334 Dime Bank Building to 74-76-79 Fort street. A complete stock of aluminum ingots, alloys, sheets, circles, plates, etc., also babbitt metal, solders and all nonferrous pig metals will be carried in the Detroit warehouse, which will be under the management of E. S. Christiansen.

ELECTION OF OFFICERS

The following men have been elected as officers of the Matchless Metal Polish Company, manufacturers of metal polishes and buffing compositions, New York, for 1918. William L. Whitson, Chicago, Ill., president; P. W. Ellwanger, New York, vice-president; S. M. Miller, Jr., New York, treasurer, and W. S. Moore, Chicago, Ill., secretary.

At the regular meeting of the Detroit Copper & Brass Rolling Mills, Detroit, Mich., the following officers were elected: President and general manager, Lewis H. Jones; vice-presidents, Richard P. Joy and Arthur H. Buhl; secretary and treasurer, Andrew J. Peoples. John R. Searles and Frank H. Hoffman were appointed assistant general managers, Wallace P. Bache, secretary and assistant treasurer and J. E. Workman, auditor. The management reported a good year just closed.

PRINTED MATTER

Trade Journal Exhibit.—The Free Public Library of Newark, N. J., had on exhibition at the library up to February 12, an exhibit of twelve hundred of the larger and more important trade journals of the country.

Grinding and Polishing Machinery.—The Webster and Perks Tool Company, Springfield, Ohio, has issued a very important loose-leaf catalog in the interest of their ball bearing, plain bearing grinding and polishing machinery. This line, known as the W & P of grinding and polishing machinery, has been manufactured for upwards of twenty-five years and now comprises the highest types of ball and babbitted bearing machines that it is possible to manufacture. Some of the machines listed in the various parts of the new catalog are bench and floor type grinders, self oiling grinding and polishing machines; tool, ringwheel and edge grinders; a large line of ring oiling and ball bearing polishing and buffing lathes, polishing and grinding machinery of practically every description. Copies of this catalog will be sent upon application.

Finishing Room Equipment.—The De Vilbiss Manufacturing Company, Toledo, Ohio, has issued Catalog M, which is really the first buyers' guide-book published by this company that comes anywhere near covering the Aeron System—its completeness, uses, advantages and economies—in an adequate and creditable way, and that closely approaches being all that a catalog should be from the viewpoint of both buyer and seller of this class of factory equipment.

The style of arrangement and the method of illustrating, describing and pricing its forty pages of matter, were followed in the endeavor to make possible a quick, yet thorough, intelligent grasp by the reader of what the Aeron System is, what it will do, and its wide range of adaptability; and in the further endeavor to put out a book of equipment and operation facts that would be of worth-while interest and benefit to prospective buyer and present user alike.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants.. See Want Ad. pages.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

FEBRUARY 11, 1918.

COPPER.

The most important feature in the copper industry in January, probably, was the reaffirmation of the fixed price—23.50c. per pound, recommended by the War Industries Board and confirmed by the President—agreed upon last September, which is to remain operative until June 1, under the same regulations as previously established, and which allows a 5 per cent advance—to 24.67½c. per pound—on sales of less than carload lots. With a settled basis upon which to depend, the outlook in the copper trade is better than in some other metals where uncertainty still exists as to what Government action will be. Maximum production, at least 225,000,000 pounds monthly, is expected; Government protection, making it unlikely that labor difficulties will harass the industry as was the case in 1917. Transportation problems and shortage of fuel are the present serious obstacles that must be overcome.

TIN.

The extraordinary situation in the tin market, noted at the close of 1917, continued throughout January. With no spot Straits metal obtainable, there were no offerings and no quotations. Permits for London shipments were held up throughout the month making it necessary to order directly from the Far East.

On the 23rd, the United States Government, through the Emergency Fleet Corporation again commandeered all of the tin in New York warehouses because of the acute shortage and the transportation difficulties. Some of this metal, was later released.

SPELTER.

The spelter market opened in January at 7.65-7.75c E. St. Louis; 7.82½-7.92½c New York basis. Brass special was in light demand at 8.12½-8.25c. St. Louis basis, which later in the month declined to 8.00c per pound. Delay in transit hampered the spelter industry and limited transactions producing most unsatisfactory conditions which further curtailed output. Ore declined from $75 to 67.50 top base. In the closing days, a somewhat better demand was developed and prices were firm but unchanged. Difficulties in making shipments were less acute. Government statistics for 1917 issued on January 10, were 665,751 tons production; 431,500 tons consumption; exports, 204,000 tons. Stocks on hand and in transit January 1, 1918, were reported between 50,000 to 60,000 tons in various estimates.

LEAD.

With the advance in the price of lead, January 3, by the leading interest to 6.50c per pound, the outside market in New York on the next day became 6.75c; the St. Louis basis being 6.55c per pound. Again on January 11, due to increased demand and the absence of sellers, another advance was made by the "Trust" to 6.75c per pound, New York, followed by a rise to 7.00c New York basis; 6.85c St. Louis in the outside market. At the close, the market was strong for prompt and early deliveries, 7.12½c New York basis; 6.75-6.95c St. Louis. March position was held ⅛c per pound lower. Lack of information as to how Government orders were running kept the trade guessing during the month but there were only small quantities available in the outside market.

ALUMINUM.

Prices of aluminum in January, after advancing 1c per pound on all varieties January 8, to 37-39c for No. 1 virgin, 35-37c for pure 98-99% remelted, 27-29c for No. 12 alloy remelted, declined 1c on January 15, to the opening prices for No. 1 virgin and for pure 98-99% remelted. No. 12 alloy remelted, however, still maintained the advance at the close of the month. Government price fixing was expected at any time, but had not been announced on January 31, although several meetings had been reported at Washington in which the matter was being considered. The Aluminum Company's contract price for ingots in 1918 remains unchanged at 38c per pound; for sheets in small lots, the 18 gauge, the base price is 46.40c and for 50-ton lots, 46.00c.

Production of metal in 1918 is expected to exceed that of 1917 by at least 35%.

ANTIMONY.

The year opened in the antimony market with expectations of early Government buying of 200 to 300 tons which was accomplished very quietly, no details being given out. Otherwise, the market was stagnant at December closing prices, 14.50-14.75c duty paid for prompt and early metal. Foreign limits were 13.50c., c. i. f. New York, for January-February shipment from the Orient.

SILVER.

Out of a total silver production of 74,244,500 fine ounces in 1917, the United States Government purchased approximately 20,500,000 ounces. At the beginning of January this year, silver was 86⅞c. per ounce. By the 8th a gradual advance had carried the price to the high point of the month, 90⅛c., this figure being maintained until the 15th, when a decline set in that carried the price to 86⅝c. at the close of the month, making the net recession only ¼c. per ounce.

QUICKSILVER.

Quicksilver in January declined from $130—135 per flask at the beginning of the year to $115—125 on January 8, after which there was no change. A heavy increase in production during 1917, due to war time necessity was reported by the Geological Survey, output being 36,351 flasks of 75 pounds each, in the United States, exceeding the previous year by 6,419 flasks.

PLATINUM.

There was no change in the price of platinum in January from the December closing, $105 for pure and $113 for 10 per cent. iridium. The Government purchase of 21,000 ounces, recently imported from Russia, was made at a tentative price of $90 per ounce.

OLD METALS.

Old metals in January, after being somewhat inactive during the first fortnight, when prices declined ¼ to ½c. per pound on copper and aluminum, experienced considerable improvement in the latter part of the month, particularly just before the close. There was an advance of ¼c. per pound on tea lead and on electrotype, 1c. on copper wire, clean red car boxes, old cast and new aluminum. The buying was largely from the West.

WATERBURY AVERAGE

Lake Copper. Average for 1917—30.97. 1918—January, 23.50.

Brass Mill Spelter. Average for 1917—11.116. 1918—January, 9.60.

JANUARY MOVEMENTS IN METALS

COPPER:	Highest.	Lowest.	Average.
Lake	....	Market Nominal	23.50*
Electrolytic	....	Market Nominal	23.50*
Casting	....	Market Nominal	23.50*
TIN	Market Nominal; no metal offering		
LEAD	7.125	6.50	6.943
SPELTER	8.25	8.00	8.074
ANTIMONY	14.75	14.00	14.226
ALUMINUM	39.00	36.00	37.238
QUICKSILVER (per flask)	$135.00	$115.00	$125.119
SILVER (cts. per oz.)	90⅛	86⅝	88.702

*Goernment price.

Metal Prices, February 11, 1918

NEW METALS. Price per lb.

COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.

Electrolytic, carload lots, nom.. } Lake, carload lots, nominal.... }	Government price	23½
Casting, carload lots, nominal		23½

TIN—Duty Free.

Straits of Malacca, carload lots	none offered

LEAD—Duty Pig, Bars and Old 25%; pipe and sheets. 20%.

Pig lead, carload lots	7.00

SPELTER—Duty 15%

Brass Special	8.10
Prime Western, carload lots, nominal	79.25

ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.

Small lots, f. o. b. factory	45.00
100-lb. f. o. b. factory	41.00
Ton lots, f. o. b. factory	37.00

ANTIMONY—Duty 10%.

Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	.13⅞

NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.

Shot or Ingots	50c.

ELECTROLYTIC—5 cents per pound extra.

MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	$2.25
BISMUTH—Duty free	$3.50
CADMIUM—Duty free nominal	$1.65
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	$3.50
QUICKSILVER—Duty, 10% per flask of 75 pounds	$130.00
PLATINUM—Duty free, per ounce	$106.00-108.00
SILVER—Government assay—Duty free, per ounce	.86⅝
GOLD—Duty free, per ounce	$20.67

INGOT METALS. Price per lb.

Silicon Copper, 10%	according to quantity	40	to45
Silicon copper, 20%	" "	50	to55
Phosphor Copper, guaranteed 15%	" "	60	to65
Phosphor Copper, guaranteed 10%	" "	56	to62
Manganese Copper, 30%, 2% Iron	" "	70	to75
Phosphor Tin, guaranteed 5%	" "	1.08	to1.15
Phosphor Tin, no guarantee	" "	95	to97
Brass Ingot, Yellow	" "	17	to19
Brass Ingot, Red	" "	25	to26
Bronze Ingot	" "	24	to25½
Parsons Manganese Bronze Ingots	" "	30½	to32
Manganese Bronze Castings	" "	40	to52
Manganese Bronze Ingots	" "	26	to30
Phosphor Bronze	" "	24	to30
Casting Aluminum Alloys	" "	37	to38

OLD METALS.

Dealers' Buying Prices.		Dealers' Selling Prices.
22.00	Heavy Cut Copper	23.50
22.00	Copper Wire	23.50
19.00	Light Copper	21.00
21.00	Heavy Mach. Comp.	23.50
14.00	Heavy Brass	16.00
10.50	Light Brass	12.50
13.00	No. 1 Yellow Brass Turning	15.00
18.00	No. 1 Comp. Turnings	21.00
5.50	Heavy Lead	6.00
6.00 to 6.25	Zinc Scrap	6.25 to 6.75
10.00 to 13.00	Scrap Aluminum Turnings	11.00 to 14.00
18.00 to 20.00	Scrap Aluminum, cast alloyed	20.00 to 22.00
26.00 to 28.00	Scrap Aluminum, sheet (new)	28.00 to 30.00
39.00 to 40.00	No. 1 Pewter	43.00 to 47.00
30.00 to 32.00	Old Nickel	34.00 to 36.00
22.00 to 23.00	Old Nickel anodes	25.00 to 26.00

PRICES OF SHEET COPPER.

Mill shipments (hot rolled)	31½c. base net
From stock	33c. base net

The following table shows the advance in cents per pound over the base price of sheet copper of various gauges, lengths and widths.

SIZE OF SHEETS.		64 oz. and over.	32 oz. to 64 oz.	24 oz. to 32 oz.	16 oz. to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
Width.	LENGTH.	CENTS PER LB.				CENTS PER LB. OVER BASE.				
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not Wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							
	Longer than 120 ins.	5	8							
Wider than 120 ins., but not wider than 132 ins.	Not longer than 132 ins.	6	9							
	Longer than 132 ins.	7								
Wider than 132 ins.		8								

Width.	LENGTH.	10 oz.	9 oz.	8 oz.	Light'r than 8 oz.
Not wider than 30 ins.	Not longer than 72 inches.	3	4½	6	9
	Longer than 72 inches. Not longer than 96 inches.	6	7½	9	
Wider than 30 ins., but not wider than 36 ins.	Not longer than 72 inches.				
	Longer than 72 inches. Not longer than 96 inches.				
Wider than 36 ins., but not wider than 48 ins.	Not longer than 72 inches.				

[The insert shows the extras on copper sheets from 10, 9, 8 and less than 8 oz. in weight, and various lengths and widths.]

The longest dimension in any sheet shall be considered as its length.

Metal Prices, February 11, 1918

Extras for Copper Sheets.

Circles, 8 in. diameter and larger, segments and pattern sheets, advance per pound over prices of sheet copper required to cut them from	3c.
Circles less than 8 in. in diameter, advance per pound over prices of sheet copper required to cut them from	2c.
Cold or hard rolled copper, 14 oz. per square foot and heavier, advance per pound over foregoing prices	1c.
Cold or hard rolled copper, lighter than 14 oz. per square foot, advance per pound over foregoing prices	2c.
Cold rolled annealed copper, the same price as cold rolled copper.	
All polished copper, 20 in. wide and under, advance per square foot over the price of cold rolled copper	1c.
All polished copper, over 20 in. wide, advance per square foot over the price of cold rolled copper	2c.
For polishing both sides, double the above price.	
The polishing extra for circles and segments to be charged on the full size of the sheet from which they are cut.	
Cold rolled copper, prepared suitable for polishing, same prices and extras as polished copper.	
All planished copper, advance per square foot over the prices for polished copper	1c.

Tinning.

Tinning sheets on one side, all sizes, per square foot, 5c.

For tinning both sides double the above price.

Extra for tinning or polishing circles and segments, to be charged on the full size of the sheet from which they are cut.

For tinning edges of sheets, one or both sides, prices shall be the same as for tinning all of one side of the specified sheet.

Oval Copper Bottoms.

Tinned One Side.

16 oz. to square foot and heavier, per pound	Base
15 oz. to square foot per lb., advance over base	½c.
14 " " " " " " " "	1c.
13 " " " " " " " "	1½c.
12 " " " " " " " "	2c.
11 " " " " " " " "	3c.
10 " " " " " " " "	4c.
Lighter than 10 oz. to square foot, per pound	7c.

Round copper bottoms, tinned one side, 8 in. (**203.2**) diameter to 17 in. (**431.8**) diameter, both inclusive, 1c. per lb. advance over ovals.

Copper circles, tinned one side, less than 8 in. (**203.2**) diameter, 3c. per lb. additional.

Copper circles, tinned one side, over 17 in. (**431.8**) diameter, not classed as copper bottoms.

Polished oval and round tinned copper bottoms, same advance as for sheets.

Copper Anodes or Battery Plates Not Larger Than 20 x 30.

⅜ in. (**9.5**) and thicker, untrimmed	lb.
⅜ in. (**9.5**) and thicker, trimmed to size	lb.

If drilled, full weight before drilling to be charged.

Nickel-Plated Copper.

Net Cash Prices.

Sheets 14 x 48 (355.6 x 1219.2) Inches.

	Advance over base per lb.	Plating per sheet
14 and 16 oz. and heavier, by the case of 500 pounds and over	6c.	40c.
14 and 16 oz. and heavier, less than one case	7c.	42c.
12 oz. and lighter, by the case	8c.	40c.
12 oz. and lighter, less than one case	9c.	42c.

Boiler Sizes.

Over 12 (.40) Oz.

By the case of 500 lbs., 7 in. (**177.8**) (14 x 52) (**355.6 x 1320.8**)	6c.	45c.
By the case of 500 lbs., 8 in. (**203.2**) (14 x 56) (**355.6 x 1422.4**)	6c.	45c.
By the case of 500 lbs., 9 in. (**227.6**) (14 x 60) (**355.6 x 1523.6**)	6c.	50c.

For less quantity than one case, add 2c. per lb. 12 oz. and lighter, add 3c. per lb.

Tinning.

For copper nickel plated on one side and tinned on the other, add for

All sizes, per square foot ..... 3½c.

Note.—The figures in heavy face type in all cases represent metric measurements.

PRICES ON BRASS MATERIAL—MILL SHIPMENTS

In effect January 3, 1918.

To customers who buy 5,000 lbs. or more per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.28	$0.31	$0.33
Wire	.28	.32	.34
Rod	.26	.32	.34
Brazed tubing	.36	—	.41
Open seam tubing	.36	—	.41
Angles and channels	.36	—	.41

To customers who buy less than 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.29½	$0.32½	$0.34½
Wire	.29½	.33½	.35½
Rod	.27½	.33½	.35½
Brazed tubing	.37½	—	.42½
Open seam tubing	.39½	—	.42½
Angles and channels	.37½	—	.42½

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

26½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	37c. per lb. base
100 lbs. to 300 lbs. in one order	38c. " " "
Less than 100 lbs in one order	39½c. " " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	33½c. net base
Muntz or Yellow Metal Sheathing (14" x 48")	30c. " "
Muntz or Yellow Metal Rectangular sheets other than Sheathing	33c. " "
Muntz or Yellow Metal Rod	31c. " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 65c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES OF NICKEL ANODES.

85 to 87% purity	52½c. per lb.
90 to 92% "	55c. " "
95 to 97% "	57½c. " "

Metal Prices, February 11, 1918

PRICES OF SHEET ZINC.

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 19c. basis, less 8%	
Casks, jobbers' prices	20c.
Open casks, jobbers' prices	20.5c.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	42½c.	16%	47c.
8%	43½c.	18%	47½c.
10%	43¾c.	20%	49¼c.
12%	45½c.	25%	57c.
15%	49c.	30%	62½c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	44c.	15%	52c.
8%	46c.	16%	52½c.
10%	48c.	18%	54½c.
12%	50c.	30%	70c.

The above Base Prices are subject to additions for extras as per list printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are correspondingly higher.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 5c. over Pig Tin. 50 to 100 lbs., 7c. over 25 to 50 lbs., 8c. over, less than 25 lbs., 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 2c. over Pig Tin. 50 to 100 lbs., 4c over, 25 to 50 lbs., 5c. over, less than 25 lbs., 8c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICES OF SHEET SILVER.

Rolled silver anodes .999 fine are quoted at —— above the price of bullion. Manufacturers state that as silver is selling at a premium at the present time they are unable to give any quotation.

STOCK MARKET QUOTATIONS: METAL COMPANIES.
New York, January 3, 1918

	Par	Bid	Asked
Aluminum Company of America	$100	560	610
American Brass	100	218	223
American Hardware Corp.	100	120	125
Bristol Brass	25	41	43
Canadian Car & Foundry, com.	100	23	27
Canadian Car & Foundry, pfd.	100	57	63
Eagle Lock	25	72	75
International Silver, com.	100	40	60
International Silver, pfd.	100	80	85
New Jersey Zinc	100	230	235
Rome Brass & Copper	100	300	325
Scovill Manufacturing	100	420	445
Standard Screw, com.	100	225	235
Standard Screw "A" pfd.	100	100	none offered
Yale & Towne Mfg. Co.	100	205	215

Corrected by J. K. Rice, Jr., & Co., 36 Wall St., New York.

PRICES CURRENT FOR ALUMINUM

Sheet Aluminum, outside market contract base price, 60c. per pound.

Sheet Aluminum, outside market stock, and mill prompt shipment, 65c. per pound.

98-99% Remelt Aluminum Ingots, outside market, 36c. per pound.

No. 1 Virgin Aluminum Ingots, outside market, 38c. per pound.

Aluminum Rods and Wire, outside market, prompt shipment, 60 to 65c. per pound.

EXTRAS FOR FLAT SHEETS ROLLING.

	To 18 Ga.	18-20	21-24	25-26	27	28	29	30	32	34
3 to 26" wide—										
24 to 96" long	Base	Base	.01	.02	.03	.04	.05	.06	.07	.08
97 to 120" "	Base	Base	.02	.03	.04	.05	.07	.08	..	..
121 to 156" "	Base	.01	.03	.05	.08	.10	..	..	..	..
26 to 47" wide—										
24 to 96" long	Base	Base	.03	.04	.05	.06	.08	.10	..	..
97 to 120" "	Base	Base	.04	.06	.07	.08	..	..	..	..
121 to 156" "	Base	.01	.05	..	..	..	..	..	..	..
48 to 60" wide—										
24 to 96" long	Base	Base	.06	.10	..	..	..	..	..	..
96 to 120" "	Base	Base	.08	..	..	..	..	..	..	..
121 to 156" "	.01	.01	.10	..	..	..	..	..	..	..
60 to 68" wide—										
24 to 96" long	Base	Base	.05	..	..	..	..	..	..	..
96 to 120" "	.01	.01	.08	..	..	..	..	..	..	..
121 to 156" "	.02	.02	..	..	..	..	..	..	..	..

EXTRAS FOR STRIP ROLLED SHEETS.

	3-13	14	15	16	18	20	21	22	24
12 to 15 Ga., Inc.	Base	Base	Base	Base	Base	.01	.02	.02	.03
16-17	Base	Base	Base	Base	Base	.01	.02	.02	.04
18-20	Base	Base	Base	Base	.01	.02	.03	.04	.05
21-22	Base	Base	Base	.01	.02	.02	.04	.05	.06
23-24	Base	Base	.01	.02	.02	.03	.05	.06	.08
25	Base	Base	.01	.02	.03	.04	..	..	..
26	.01	.01	.02	.03	.04	.05	..	..	..
27	,01	.01	.02	.03	.05	.06	..	..	..
28	.02	.02	.03	.05	.07	..	..	..	..
29	.02	.02	.03	.05	.08	..	..	..	..
30	.03	.03	.04	.06	..	..	..	..	..
32	.04	.04	.06	..	..	..	..	..	..
34	.05	.06	..	..	..	..	..	..	..

EXTRAS FOR SHEARING.

	12 to 20	21 to 26	27 to 30	31 to 34
Less than 3" to 1½" wide	.01	.02	.03	.04
Less than 1½" to ¾" wide	.02	.03	.04	.06
3 to 30" wide—				
12 to 24" long	.02	.03	.04	.07
6 to 12" long	.04	.05	.06	.08
3 to 6" long	.06	.08	.09	.10

Circles 3c. per pound extra.

Supply Prices, February 11, 1918

PRICES OF SOME METAL INDUSTRY CHEMICALS AND MATERIALS

Acid—		
Acetic, 30%	lb.	—
Acetic, glacial, 99½%, carboys	lb.	—
Boric (Boracic) Crystals	lb.	.25
Hydrochloric (Muriatic) Com., 18 deg	lb.	.08
Hydrochloric, C. P., 22 deg	lb.	*.16
Hydrofluoric, 30%	lb.	.40
Nitric, 36 deg	lb.	.09¼
Nitric, 42 deg	lb.	.11⅛
Sulphuric, 66 deg	lb.	.08
Alcohol, wood, 95%	gal.	—
Denatured	gal.	1.05
Alum—		
Lump	lb.	.09
Powdered	lb.	.15
Aluminum sulphate, iron free	lb.	.15
Aluminum chloride solution	lb.	.16
Ammonia aqua, 26 deg., carboys	lb.	—
Ammonium carbonate	lb.	—
Chloride	lb.	—
Hydrosulphuret	lb.	—
Sulphate, tech.	lb.	.10
Sulphocyanide	lb.	—
Amyl acetate	gal.	—
Arsenic, white	lb.	—
Argols, white, see Cream of Tartar	lb.	.75
Asphaltum	lb.	.35
Benzol, pure	gal.	1.00
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate)	lb.	.15
Calcium Carbonate (Precipitated Chalk)	lb.	.15
Carbon Bisulphide	lb.	.20
Chrome Green	lb.	—
Cobalt Chloride	lb.	—
Copper—		
Acetate (Verdigris)	lb.	—
Carbonate	lb.	.40
Cyanide	lb.	1.00
Sulphate	lb.	.17
Copperas (Iron Sulphate)	lb.	.06
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.75
Crocus	lb.	.10
Dextrin	lb.	.20
Emery Flour	lb.	.10
Flint, powdered	ton	—
Fluor-spar (Calcic fluoride)	ton	—
Fusel Oil	gal.	—
Gold Chloride	oz.	12.00
Gum—		
Sandarac	lb.	—
Shellac	lb.	—
Iron Sulphate, see Copperas	lb.	.06
Lead Acetate (Sugar of Lead)	lb.	.35
Yellow Oxide (Litharge)	lb.	.20
Liver of Sulphur, see Potassium Sulphide	lb.	.15
Mercury Bichloride (Corrosive Sublimate)	lb.	—
Nickel—		
Carbonate, dry	lb.	.80
Chloride	lb.	.70
Salts, single bbl.	lb.	.14
Salts, double bbl.	lb.	.12
Niter (Saltpeter), see Potassium Nitrate.		
Paraffin	lb.	.20
Phosphorus—Duty free, according to quality		nominal
Potash, Caustic (Potassium Hydrate)	lb.	—
Lump	lb.	—
Potassium Bichromate	lb.	—
Carbonate, 34-36%	lb.	—
Cyanide, 98-99½%	lb.	—
Sulphocyanide	lb.	—
Pumice, ground	lb.	—
Quartz, powdered	ton	—
Official	oz.	.73⅝
Rosin	lb.	.08
Rouge, nickel	lb.	.25
Silver and gold	lb.	.40
Sal Ammoniac (Ammonium Chloride)	lb.	—
Sal Soda	lb.	.05
Silver Chloride, dry	oz.	—
Cyanide	oz.	—
Nitrate	oz.	60⅞
Soda Ash, 58%	lb.	.08
Sodium—		
Biborate, see Borax	lb.	.15
Bisulphite	lb.	.15
Cyanide	lb.	.37
Hydrate (Caustic Soda)	lb.	.15
Hyposulphite	lb.	.08
Nitrate, tech.	lb.	.10
Phosphate	lb.	.14
Silicate (Water Glass)	lb.	.05
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.35
Sulphur (Brimstone)	lb.	.10
Tin, Chloride	lb.	.75
Tripoli Composition	lb.	.06
Verdigris, see Copper Acetate	lb.	—
Water Glass, see Sodium Silicate	lb.	.05
Wax—		
Bees, white ref. bleached	lb.	—
Yellow	lb.	*.60
Whiting	lb.	.05
Zinc, Carbonate	lb.	.30
Chloride	lb.	.35
Cyanide	lb.	*1.00
Sulphate	lb.	.12

PRICES FOR COTTON BUFFS.

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth		base	$52.65
14 " 20 " 64/68, "		"	68.35
12 " 20 " 84/92, "		"	55.30
14 " 20 " 84/92, "		"	71.70

Sewed buffs per pound.

Bleached and unbleached	base	44c.
Colored	"	41c.

PRICES FOR FELT WHEELS.

White Spanish—

Diameter	Thickness	Price
6 to 10 inch	1 to 3 inch	$2.60 per lb.
10 to 16 "	1 to 3 "	2.50 " "
6 to 16 "	Under 1 "	2.75 " "
Over 16 "	Over 3 "	2.60 " "

Mexican Wheels—

Diameter	Thickness	Price
6 to 10 inch	1 to 3 inch	$2.50 per lb.
10 to 16 "	1 to 3 "	2.40 " "
6 to 16 "	Under 1 "	2.65 " "
Over 16 "	Over 3 "	2.50 " "

*Wholesale price.